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ABSTRACT

Scientifically validated methods of reducing tension and alleviating tension disorders are reported in the papers presented at this convention. Treatment for the physical manifestations of anxiety such as sleeplessness, speech difficulties, and forgetfulness is described in several papers. The effectiveness of hypnosis and coordination of the psychophysical mechanism of the body are discussed as forms of tension control. Particular attention is paid to methods of training in progressive relaxation. (JD)

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TENSION CONTROL

Proceedings of the Fifth Annual Meeting of

the

American Association for the Advancement of

Tension Control

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Edited by

F. J. McGuigan, Ph.D.

Chicago, Illinois

October 28-29, 1978

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F. J. McGuigan, Ph.D.

American Association for the Advancement of Tension Control, Incorporated

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ABOUT THE ASSOCIATION

Tension is a major cause of health problems. It is more common than the common cold. The American Association for the Advancement of Tension Control was formed in 1973 to combat the many prevalent tension problems in modern society.

AAATC believes that millions of people are shortening their lives because they do not know how to relax effectively. Our aim is to inform them about scientifically-validated methods of reducing tension and alleviating tension disorders. We know that scientific relaxation, when properly carried out, can prevent as well as alleviate tension problems.

We seek, through our annual meeting, workshops, and classes in tension control, to further the application of those relaxation methods which have proved effective. We also encourage scientific research to further develop new methods of relaxation.

We hope that you as a reader of these Annual Proceedings will be interested in joining our organization, if you are not already a member, and working with us to promote a more relaxed society.

Membership in AAATC is open to all persons. We have seven fields of application: Dentistry, Education, Medicine, Physical Therapy, Speech Therapy and Human Communication, and Members-at-Large. We also have student members. You may request membership or nominate a new member by writing the Executive Director, P. O. Box 8005, Louisville, Ky., 40208.

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THE PROGRAM

Relaxation is not Relaxation is not Relaxation:

Cognitive and Somatic Patterning in Meditation Versus Exercise[1]

Gary E. Schwartz, Ph.D.

Yale University

New Haven, Connecticut

[1]Paper adopted from Schwartz, G. E., Davidson, R. J. and Goleman, D. J. Patterning of cognitive and somatic processes in the self-regulation of anxiety: Effects of meditation versus exercise. Psychosomatic Medicine, 1978, 40, 321-328. This research was supported by an award to G. E. Schwartz from the Stress Grant program and by an NSF predoctoral fellowship to R. J. Davidson. The assistance of M. Finn in computer analysis and J. Siewe in administration of the questionnaire is gratefully acknowledged. Gerald C. Davidson provided helpful comments on an earlier draft of the paper.

Introduction

Recent evidence has begun to challenge long-held assumptions regarding hypothetical, relatively global internal states such as relaxation and anxiety. These findings have important implications for both the assessment and treatment of stress related disorders. The purpose of this article is to selectively review some of these data and to describe the results of a study designed to explore the differential effectiveness of two types of relaxation procedures in attenuating different components of anxiety.

Various writers have begun to comment on the multidimensional nature of fear and anxiety (e.g. 2, 3). When anxiety is produced in response to a stressful event, the quality or pattern of feelings aroused in one situation may be different than in another. Furthermore, some people may experience anxiety predominantly in one mode, while others may become anxious in a different manner. Unfortunately, the typical anxiety questionnaire provides but a single, global score reflecting an unknown mixture of typologically different forms of anxiety.

That different dimensions of anxiety exist has been suggested psychometrically through factor analytic studies of the traditional anxiety questionnaires. For example, various investigators have uncovered partially independent, trait anxiety factors on the basis of factor analyzing the MAS (e.g. 4, 5). More recently, Barrett (6) has performed an item analysis of anxiety items from a large battery of commonly used scales. The analysis "indicated two major subsets: (1) awareness of somatic changes, for example I blush often or I am often aware of my heart beating; (2) conscious awareness of unpleasant feelings about self or external stimuli, for example, I frequently find myself worrying about something . . ." (6, p. 202). Two similar factors emerged from studies using psychiatric patients as subjects. In factor analyses of self-ratings, Hamilton (7) and Buss (8) found that two factors, labeled "psychic" and "somatic" anxiety, accounted for the major protions of the variance in test performance.

On the basis of these results as well as a series of interviews with anxious patients, Schalling and her colleagues (e.g. 9) developed a multicomponent anxiety inventory. It consisted of separate psychic and somatic subscales with 20 items each. Unfortunately, the face validity of item assignment to each of the two subscales is not immediately apparent. The somatic anxiety scale "included items concerning autonomic disturbances (n=9), disquietable and mental discomfort of a diffuse kind and panic attacks (n=9), concentration difficulties and distractibility (n=2) . . . The psychic anxiety scale included items referring to worrying and pronounced anticipatory reactions as well as prolonged post-stress reactions (n=10) and increased muscular tension (n=4), . . . the remaining six items concerned nervousness and lack of self-confidence in social situations" (9, p.611).

The apparent item content overlap is borne out in Schalling et al's (9) finding of a .81 correlation between subscale scores in a group of psychiatric patients. However, it should be noted that even though the subscale scores were highly correlated, a different pattern of correlation was obtained between each subscale score and the Eysenck Personality Inventory Neuroticism and Extraversion Scales.

Schalling et al (9) found that both psychic and somatic anxiety were highly positively correlated with neuroticism (.70 and .90 respectively). However, psychic anxiety was inversely related to extraversion (-.50) while somatic anxiety was unrelated to this construct. Thus, psychic anxiety appears to be more prominent in introverts versus extraverts.

On the basis of both logical and empirical analyses of the anxiety construct, Borkovec (10) has arrived at a similar distinction with some minor modifications. He operationally defines anxiety by the multiple measurement of three separate but interacting response components: cognitive, overt behavioral and physiological. He suggests that each of these systems may be separately influenced by different environmental conditions and that individuals may differ "in the intensity and/or functional importance of the response from each component in reaction to a particular feared stimulus" (10, p. 267).

The fact that anxiety may be defined by the measurement of these three response components does not necessarily imply that an individual is capable of self-reporting on these separate systems. It rather appears that cognitive and behavioral symptoms, as well as more covert somatic ones such as perspiration are most prominent in consciousness. Physiological parameters may be seen as providing independent measures sensitive to cognitive versus behavioral/somatic processes but not necessarily always a part of the phenomenology of anxiety.

The multi-dimensional nature of anxiety is also revealed in psychophysiological research on fear reduction. For example Hodgson and Rachman (3) have observed desynchrony in different physiological dependent measures which all have considerable face validity. In a study designed to explore the efficacy of learned control of alpha for reducing stress associated with an aversive stimulus, Orne and Paskewitz (11) observed significant psychophysiological fractionation and specificity. They found no significant decrement in learned control of occipital alpha presence when subjects were confronted with the possibility of receiving an electric shock, while heart rate and spontaneous skin conductance responses were elevated. Orne and Paskewitz conclude that their data "demonstrate that it is possible for the subjects to report the experience of apprehension or fear as well as manifesting the autonomic concomitants of such experiences without associated changes in alpha density" (p. 460).

Findings such as these raise important questions concerning the assumed undifferentiated nature of arousal which was hypothesized to underlie such states as anxiety. Instead of assuming as some activation theorists have occasionally done (e.g. 12), that such fractionation is indicative of poor validity for the measures in question or inadequacies in the measurement procedures, we can view data such as these as reflecting meaningful patterns of physiological processes which are associated with particular behavioral and experiential states (e.g. stress and relaxation).

A number of clinical researchers have suggested, on the basis of findings such as those reviewed above, that different subsystems involved in dysfunctional states may be separately manipulated (e.g. 2). Lazarus (13) has recently proposed that therapeutic regimes be individually constructed to reduce troublesome symptoms in the specific modes and systems which have gone awry. Although data are currently available which indicate that different relaxation procedures elicit distinct patterns of autonomic activity (e.g. 14), little systematic work has been performed in specifying which particular therapeutic interventions should attenuate specific subcomponents of anxiety (see 1).

Based on the psychometric and psychophysiological research reviewed above, Davidson and Schwartz (1) have developed a psychobiological model of subcomponents involved in relaxation and anxiety. We began with the assumption of two relatively independent types of anxiety: cognitive (psychic) and somatic.[2] We further suggested that different procedures utilized in the reduction of anxiety differ in the degree to which they affect the cognitive versus somatic system. For example, while physical exercise has been found to reduce global anxiety under certain situations (15), it was hypothesized that such an activity would specifically lead to reductions primarily in somatic anxiety with less of an effect upon cognitive anxiety. Alternatively, a relaxation technique requiring the self-regulation of cognitive versus somatic processes was suggested to specifically attenuate anxiety in the cognitive system.

These predictions are based upon well known principles of psychobiological specificity. If we conceptualize particular biobehavioral systems as having a finite amount of channel space, and if we further assume that cognitive or somatic anxiety, for example, represents a recycling of unwanted information in each of the respective systems, then further activity of a neutral nature in a particular system will compete with the ongoing behavioral sequence for channel space. This competition results in an attenuation of the ongoing behavior. In the non-clinical realm, this basic principle has been observed consistently in research on cognitive processes.

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[2]It should be emphasized that this is the most basic of all splits. For example, somatic may be further subdivided into skeletal and autonomic and cognitive may be dissected into right versus left hemisphere mediated (1).

Segal and her colleagues (16, 17) have explored whether the generation of imagery in a given mode (e.g. visual versus auditory) will inhibit the perception of stimuli in that mode more than in an irrelevant mode. Subjects were asked to generate both auditory and visual images, and their task involved detecting both auditory and visual signals. It was reliably demonstrated that auditory images interfered more with detection of auditory signals, and visual images with the detection of visual signals. Similar data have been obtained in the area of hemispheric-specific competition (e.g. 18, 19).

One way of assessing the utility of subdividing anxiety into cognitive and somatic components is to examine the differential effects of relaxation procedures specifically hypothesized to reduce anxiety in one versus the other mode. Any such attempt necessitates a measuring instrument with separate cognitive and somatic subscales. Since the one existing scale of this nature has been found to consist of subscales which are highly correlated (9), one purpose of the present study was to develop an anxiety symptom check list with separate cognitive and somatic scales. The second purpose was to determine the utility of the cognitive/somatic dichotomy by assessing the efficacy of physical exercise (a somatic procedure) versus meditation (a cognitive procedure relative to physical exercise; see 1), in the differential reduction of the cognitive and somatic components of anxiety.

Methods

Subjects

A total of 77 persons were employed as subjects (Ss). Forty-four Ss were participants in a physical exercise class[3] and attended a mean of 3.56 one hour sessions per week. Thirty-three Ss practiced cognitively based, passive meditation (1) at least once daily. The type of meditation practiced was primarily transcendental meditation (See 20) although a small number of Ss practiced other passive techniques such as attending to and counting breathing. All subjects were practicing either meditation or physical exercise for at least one month with the median duration of practice being approximately six months, within each group.

The age and sex distributions of the two groups were beyond our control and hence not matched. The physical exercisers had a mean age of 27.36 (SD=6.03) while the meditators had a mean age of 20.86 (SD=2.74). The exercisers were predominantly female while the sex ratio of the meditators was approximately equal. However, since the findings for the total sample are observed in analyses based on smaller matched subgroups, it is likely that the age and sex differences are not responsible for the observed differences in patterns of cognitive and somatic anxiety. All subjects were solicited unpaid volunteers.

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[3]The exercise class was conducted by Maggie Letvin at MIT.

Cognitive-Somatic Anxiety Questionnaire (CSAQ)

A cognitive-somatic trait anxiety inventory was constructed by selecting items from well known questionnaires which three independent judges unanimously agreed reflected cognitive or somatic anxiety. The fourteen items comprising the inventory, half cognitive and half somatic, are presented in Table 1. Subjects were asked to "rate the degree to which you generally or typically experience this symptom when you are feeling anxious" by circling a number from 1 through 5 with 1 representing "not at all" and 5 representing "very much so." The sums of the circled ratings were separately computed for the cognitive and somatic items and constituted the main dependent measures. The cognitive and somatic items appeared in random order.

To ascertain the validity of the CSAQ, correlations were computed between the latter test and a standard measure of trait anxiety. The Spielberger State-Trait Anxiety Inventory (21) was administered in the trait form to a sample of 78 nonexercisers and it was observed that separate correlations between the cognitive and somatic scales of the CSAQ with the STAI were both significant ($r=.67$ and $.40$ respectively; for both $p<.001$).

The correlation between the cognitive and somatic scales of the CSAQ for the entire sample was $r=.42$. This represents a substantially lower correlation than was obtained by Schalling (.81) between the psychic and somatic subcomponents of her multicomponent anxiety inventory (9). These data indicate that the cognitive and somatic scales are modestly correlated, and that their shared variance is sufficiently low to allow for patterning of results as a function of different training techniques.

Procedure

Subjects were presented with the CSAQ in the context of a larger battery of tests. The subjects in the exercise group were asked to fill out the questionnaires at the end of a class while the remaining subjects were given the questionnaires in a classroom (at Harvard) and asked to complete them at home and return them the following day. All subjects were told that these questionnaires were part of a study on psychological concomitants of different forms of self-regulation techniques.

Results

An analysis of variance with Group (Exercisers vs. Meditators) as a between factor and mode of anxiety (cognitive vs. somatic) as a repeated factor revealed, as predicted, a significant interaction ($F(1, 75) = 5.32$ $p<.03$). This interaction is illustrated in Figure 1 and indicates that meditators report less cognitive and more somatic anxiety than exercisers and conversely, exercisers report less somatic and more cognitive anxiety than meditators. Importantly, the main effect for group was not significant ($F<1$) indicating that the two groups did not differ on overall anxiety but rather, on the specific patterning of anxiety subsystems. Interestingly, the significant interaction is largely a function of the significantly higher congitive versus somatic anxiety within the exercisers ($t=2.32$, $df=43$, $p<.05$). The meditators

Table 1

Cognitive	Somatic
I find it difficult to concentrate because of uncontrollable thoughts.	My heart beats faster.
I worry too much over something that doesn't really matter.	I feel jittery in my body.
I imagine terrifying scenes.	I get diarrhea.
I can't keep anxiety provoking pictures out of my mind.	I feel tense in my stomach.
Some unimportant thought runs through my mind and bothers me.	I nervously pace.
I feel like I am losing out on things because I can't make up my mind soon enough.	I become immobilized.
I can't keep anxiety provoking thoughts out of my mind.	I perspire.

Table 1: Item content of the Cognitive-Somatic Anxiety Questionnaire (CSAQ) separately for cognitive and somatic items.

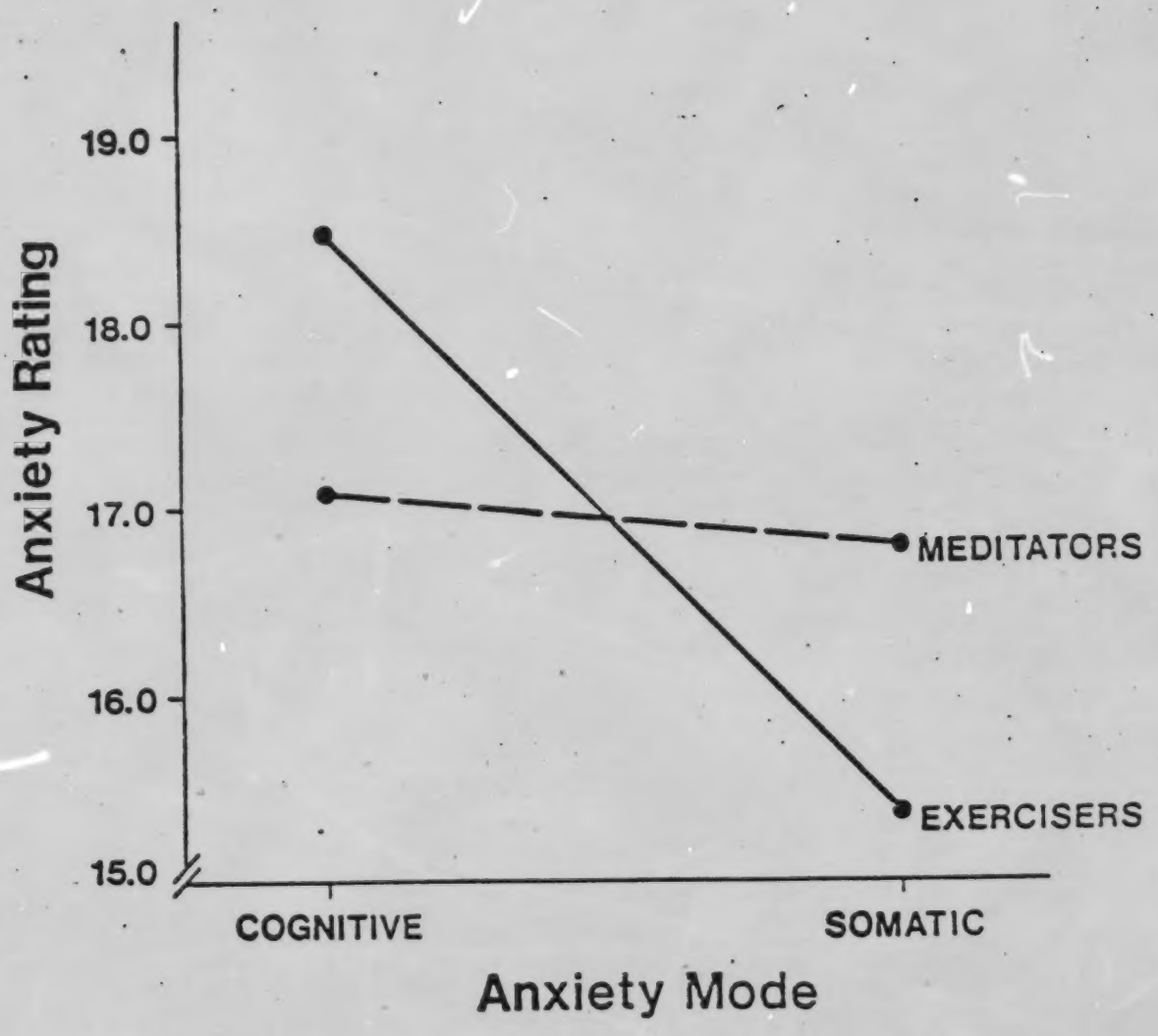

Figure 1. Mean anxiety rating on the separate cognitive and somatic scales of the Cognitive-Somatic Anxiety Questionnaire (CSAQ) by group. For exercisers, N=44; for meditators, N=33.

revealed no significant difference between the two anxiety modes.

Discussion

The present findings support the general thesis that anxiety is not a diffuse, undifferentiated internal state, but rather reflects a set of patterns of specific psychobiological processes having important implications for the assessment and treatment of stress related disorders. Clearly, subdividing anxiety into its cognitive and somatic components as measured by the present questionnaire is itself an oversimplification (1), but it is a useful starting point for stimulating theory and research. In a recent study which emerged from the present findings, it was found that cognitive and somatic anxiety could be reliably distinguished on the basis of the patterning of cardiovascular, electrodermal and electromyographic measures (22). More sophisticated psychobiological subdivisions of anxiety would include examination of hemispheric asymmetry in emotion (23,24), and differential patterning of fundamental emotions in anxiety and depression (25). The relevance of the latter concept to the psychophysiological assessment of depression and anxiety has been recently documented by measuring patterns of facial muscle activity in different affective states (26). The systematic assessment and self-regulation of psychophysiological patterning and specificity is rapidly becoming an important tool in the understanding and treatment of a variety of clinical dysfunctions (27,28).

The data generated in this study and the body of literature reviewed in the introduction question the notion of a generalized, relaxation response as a complete description of the nature of relaxation.

The present findings suggest that different techniques employed for the elicitation of relaxation may be associated with specific consequences which in turn may be a function of the underlying systems directly affected by the procedure in question. Just as recent psychophysiological research has challenged the adequacy of concepts of generalized arousal (See 28), so too in the clinical domain, conceptions of undifferentiated relaxation and anxiety are incomplete.

Importantly, however, the patterning of biobehavioral systems may be superimposed upon a more non-specific continuum of relaxation and anxiety and assessment may be made of both the general level of relaxation and anxiety as well as their specific subcomponents.

We would propose that relaxation consists of 1. a generalized reduction in multiple physiological systems (termed the relaxation response by Benson) and 2. a more specific pattern of changes superimposed upon this general reduction which is elicited by the particular technique employed. The present line of reasoning highlights the importance of considering these components in any complete account of anxiety and relaxation.

The findings obtained in the present study are consistent with the hypothesis that the practice of meditation versus exercise may be associated with the differential patterning of cognitive and somatic symptoms of anxiety (1). The regular practice of physical exercise, a somatic relaxer, was associated with less somatic and more cognitive anxiety than the regular practice of meditation, a technique believed to be associated with cognitive relaxation (See 1, 30). If the theory is correct, then "relaxation is not relaxation is not relaxation".

However, a cautionary note should be raised in interpreting the present data. Although the subjects practicing either physical exercise or meditation had been doing so on a regular basis for a median duration of approximately six months, the present retrospective design does not rule out the possibility of predispositional (including expectations) contributions to the observed effects (e.g., 31). It may be the case that individuals attracted to the practice of meditation versus physical relaxation differ in their patterning of cognitive and somatic anxiety. The influence of such predispositional variables may be unambiguously disentangled in the future with longitudinal, prospective designs which include appropriate behavioral and physiological measures.

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Aspects of Tension Manifestations in Speech

By

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"To see what is general in what is particular and what is permanent in what is transitory is the aim of scientific thought." Thus wrote Alfred North Whitehead (1948, p.4). The tasks assigned to us by Professor Whitehead can become particularly difficult at those times when we attempt to extend the methods of scientific analysis to new problem areas. Our fresh subject matter may early on show resistance to analysis, particularly when the material to be examined is both generous in quantity and rich in diversity. This point has been well illustrated by work on the analysis of speech disorders.

It should be noted that the scientific examination of speech disorders is still young. The discipline was formally established about 50 years ago. Empirical methods are often crude and speculation substantially exceeds careful investigation.

Nonetheless, speech, that finely coordinated dance of articulation, phonation and respiration, is coming increasingly within the purview of science, and aspects of its essential lawfulness are becoming known.

This report will examine briefly how tension can manifest itself in speech--often with profound consequences. Please note that the emphasis here is upon the physical characteristics of speech: 1) gestures of articulation involving the tongue, lips, jaw and soft palate; 2) laryngeal movements, particularly in those muscles which control adduction, abduction and tension of the vocal folds; and 3) speech related respiratory movements.

There is often a tendency when dealing with the topic of tension and speech to shift focus from speech gestures to the content of what is said. Speech is, of course, the fundamental vehicle for the expression of our inner lives. It is easy to see how the content of speech may attract attention from the mechanisms of production. Our traditions of psychoanalytic thinking have consistently emphasized such an approach in attempts to understand speech. In this writer's opinion, such a shift of foucs is analogous to our attempting to understand how an automobile functions at the mechanical level by asking the driver where he is going. The analysis of the tension effects in speech should focus primarily on the mechanisms of speech production rather than on the emotional reactions of those who are troubled by tension.

Speech consists of specific movement patterns of the vocal apparatus which yield audible acoustic correlates. Each distinctive set of movements produces unique acoustic consequences, many of which we recognize as speech elements. The basic mechanisms for speech production are shown in Figure 1. The major components are concerned with the functions of respiration, voicing and articulation.

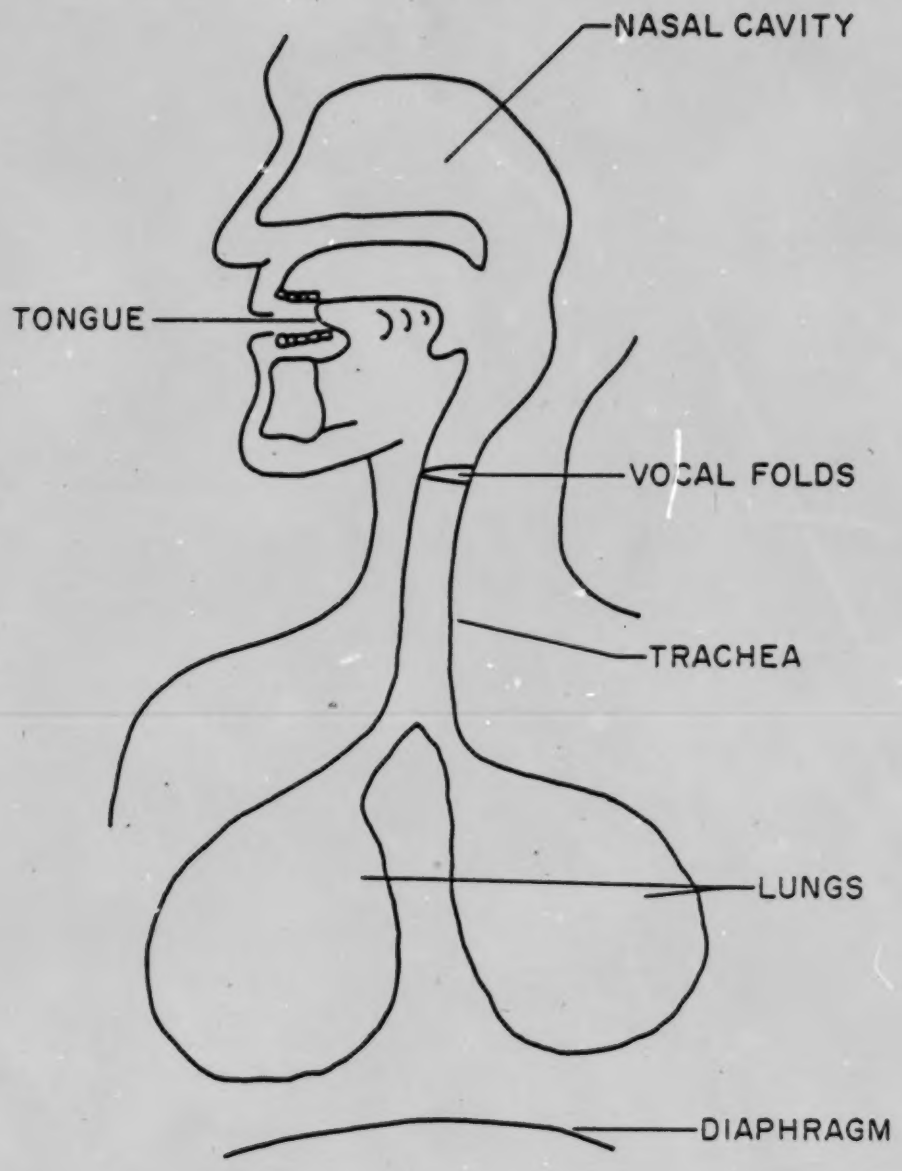

Figure I. THE VOCAL ORGANS

The lungs consist of elastic tissue which store air under pressure. Air is drawn into the lungs through the action of atmospheric pressure when muscles are activated in the thorax and abdomen. Expulsion of air from the lungs normally occurs when the respiratory muscles relax and the natural elasticity of body tissue compresses the lungs. Additional force can be mustered by the abdominal muscles to squeeze air from the lungs if required.

Approximately 500 cc of air is exchanged by the adult male during quiet breathing and quiet speech related breathing. The maximum exchange of air during exaggerated inhalation and exhalation is approximately 3500 cc (Dew and Jensen, 1977). During speech, air is driven from the lungs through the trachea to the larynx.

The larynx is a cartilaginous structure suspended by straps of muscle reaching from the skull, jaw, sternum and scapula (Dew and Jensen, 1977). Within the larynx are the vocal folds, a set of ligaments and muscles which attach to the thyroid cartilages and to the arytenoid cartilages of the larynx. The resulting V-shaped opening is known as the glottis. The folds open when the arytenoid cartilages slide apart and close when they come together. The intrinsic muscles of the larynx control the glottal opening. The vocal folds are abducted by the posterior cricoarytenoid muscle and adducted by the arytenoideus and the lateral cricoarytenoid muscles. The vocal folds are shortened and thickened by the thyroarytenoid muscle and lengthened by the cricoarytenoid muscle. Complex and rapidly occurring adductor-abductor relationships characterize the movements of the intrinsic laryngeal muscles.

When the vocal folds are approximated, expulsion of air through the folds produces a quasi-periodic sound which we recognize as voice or phonation. The folds vibrate in a range of 80-300 HZ in adult males (Lieberman, 1977). A different sound, that of noise, is generated when the folds are held somewhat apart and air is expelled. The friction sound (h) is heard and is produced by turbulence in the air stream.

Note that not all speech sounds involve voicing. We recognize voicing as an essential component of some vowels and consonants. For example, the vowels (here represented by the letters A, E, I, O, U) all involve voicing as do some consonants (M, N, L, R, V). Other sounds require the omission of voicing. These are the voiceless fricatives (F, Ch, Sh, H, S). For still other sounds, there is a finely coordinated production of voice with articulatory activities; for example, the puff of air which precedes voicing when we say the syllable "pie" or the simultaneous release of the puff and voicing on the syllable "bee."

The vocal tract is located above the larynx and contains articulatory mechanisms that shape the energy release from the larynx prior to its

emission from the body. The moveable articulators affect the shape of the vocal tract and alter the resonance properties of the acoustic signal being radiated. Each vocal tract shape is associated with particular resonance patterns.

There are two levels of features to be considered when we examine the matter of how meaning is carried in speech. Segmental features consist of basic speech sounds. These are normally thought of as the fundamental constituents of meaning--strings of segments represent words, phrases and sentences. However, there are aspects of speech which carry meaning along with the segments. Suprasegmental features are the prosodic (or melodic) components of the speech flow. They consist of pitch, time, loudness, stress and vocal quality. Analysis of the constituents of prosodic features in meaning is often complicated by the fact that the features covary. Relational components in these measures carry special meaning.

It is clear that a substantial level of meaning in our speech is carried by these prosodic features. Careful observers can recognize changes in emotional or physical condition of speakers by attending to prosodic details. There are distinct prosodic properties that permit identification of current state. For example, there is the "alive," vibrant voice of a person who is feeling really well and showing it, or the "tired" or "worried" voice of a person who is fatigued or ill.

In his book, The Voice of Neurosis, Moses (1954) developed the point that emotional states can be determined from suprasegmental features. More recently, Helmick (1968) reported that when three different trained speakers read a simple five-word declarative sentence in different ways--assured, disagreeable, indifferent, surprised and uncertain--listeners attained identification accuracies of up to 94%. Prosodic features provided the distinctive information used by the listeners in making their judgments. Helmick also reported that identification accuracies fell when untrained speakers performed the same task.

A more precise quantitative manipulation of the prosodic pitch feature was achieved by Lieberman and Michael (1962). Pitch information was extracted from recorded speeches which had been subjectively evaluated as "doubting," "bored,""confidential," etc. The pitch signal was varied then during the construction of non-speech melodies. Listeners reliably identified the emotions conveyed in these segment-free tunes.

There is not sufficient space to elaborate at length here on the details of prosodic features. A few brief comments will have to suffice. The time feature in prosody deals with syllable lengths (about .18 seconds in normal American English), tempo (about four syllables per second or 80-200 words per minute with an average of about 170 words per minute), and pauses (in conversational speech about 35-65% of the total speaking time is devoted to pauses).

The loudness feature is also an important prosodic component. Speech stimuli presented by those around us may vary substantially in power. An average voice may have 100 times the power of a quiet voice, and a loud voice may have 100 times the power of an average voice (Tiffany and Carrell, 1977). Good speaking voices, as determined by critical listeners, show approximately 20% more variation in loudness than the voices of poor speakers (Murray and Tiffin, 1934).

The stress feature represents a complex of cues involving pitch, loudness and duration. Investigators of stress discuss both sentence stress and word stress. Stress patterns, complex as they may be, provide critical information in speech by flagging points of emphasis and focusing our attention on them.

The last prosodic feature mentioned, voice quality, is particularly important because it carries a great deal of information about a speaker's health and emotional state. Voice quality is also the most complex of prosodic features. It consists of pitch, loudness, voicing, vocal constriction, vocal mode (that is the register in which the voice is used) and vocal focus (Perkins, 1977). The nomenclature for describing voice quality is not completely standardized and subjective judgments are relied upon extensively in evaluation of voice quality.

I have dwelt upon the suprasegmental features of speech at some length. I have done this for two purposes. First, in our considerations of speech, we often fail to deal with the cues which are part of the basic complex in speech. We must be reminded of their presence. Second, the effects of tension upon speech are most likely to be detected at the level of the suprasegmental features. There is substantial agreement that life stress effects are manifested in speech. However, a careful examination of the literature leaves one with the impression that this view represents an article of faith. Data which bear directly on this issue are scarce.

It is helpful in considering stress effects upon speech to make a distinction between speech problems which may be exacerbated by stress and those which are stress induced and stress maintained. There appear to be few disorders which fall clearly into the latter category. There are individuals who respond to continuing life stress with aberrant levels of tension in speech musculature.

The largest clinical category which includes tension disorders of speech is that of functional dysphonia. Approximately 35% of the voice cases seen at large clinics are likely to receive this designation (Cooper, 1973).

While numerous speech disorders are adversely influenced by stress, functional dysphonia is most clearly tension induced. In functional dysphonia, the person afflicted demonstrates difficulty in the production of voice.

No laryngeal pathology is detected through examination of the vocal apparatus. The dysphonia may be variable in occurrence rather than persistent and life stresses are usually readily identifiable. Vocal fatigue is often reported, as are excessive throat clearing, tightness or pain in the throat, persistent sore throat and frequent coughing. Auditory components are hoarseness, a skipping in the presence of voice, limited vocal range and an inability to speak at will. In extreme cases, aphonia may be present.

Here are some examples of the speech of cases designated as functionally dysphonic:

1. 56-year-old male - gradual loss of voice over a two-year period--no voice at all at times.

2. 49-year-old female - gradual loss of voice.

3. 24-year-old female - gradual loss of voice.

4. 54-year-old - tight voice, high vocal effort.

These cases demonstrate tension effects rather strongly. In all instances, serious life stresses were readily identified.

Therapy for functional dysphonia is not well standardized. Clinicians may employ vocal rest, attempts to normalize phonation through training and reduction in life stress. More recently, relaxation techniques, biofeedback and other special instruments have been used.

New procedures appear to be relatively reliable in establishing improved vocal function. Several of my colleagues and I are presently involved in the exploration of teaching "functional relaxation" to individuals with voice disorders. Functional relaxation refers to the establishment of muscle tension levels which permit the production of low effort responses.

In normal, quiet speaking functional relaxation is attained by most speakers. We have developed a small computer device for use in establishing functional relaxation in the initiation of voice. Initial levels of voice amplitude and rate of loudness increase in voice are measured, compared with internal standards and the correctness or incorrectness of a response is indicated to the client. The device functions as an acoustically based biofeedback device.

We have recently begun to extend use of the voice onset computer from the treatment of stuttering (Webster, 1978) to the treatment of voice disorders. Our initial clinical trials have been encouraging. We have just completed a follow-up on a 57-year-old male who experienced a severe loss of vocal function over a five-year period. During an intensive three-week therapy program based on use of the voice computer, this man acquired good voice quality and transferred it into his daily life. Two months post therapy his vocal quality was still good to excellent.

It is also possible for individuals to show voice problems as a result of abnormal tension states associated with continued vocal misuse, use of incorrect pitch, improper breath support and forced changes in voice quality. Vocal abuse qualifies here, too. Screaming and speaking in competition with noise can lead to continuing deviant patterns of muscle tension and damage to the vocal folds.

Long-term vocal misuse or abuse may lead to vocal nodules appearing at the anterior and middle third of the vocal folds (Perkins, 1977). Nodules represent tissue reaction to the slamming together of vocal folds as a result of excessive muscle tension. Nodules may develop on one or both cords. The tissue reaction may also be in the form of a hematoma or hemorrhaging of tissue.

Contact ulcers are also observed to occur along the cartilaginous vocal processes. Excessive pressure on the arytenoid processes occurs when the voice is forced to a lower-than-normal pitch. The surface epithelium may be ground away and granulated tissue may form. Without vocal rest and appropriate treatment, the lesion is likely to spread. This form of vocal pathology is more evident in males than in females.

It is clear that relaxation-based approaches are relevant for the treatment of vocal misuse and vocal abuse. EMG biofeedback training has been shown to reduce muscle tension levels in vocal misusers and to reduce the size of vocal nodules. Clinical ratings of voice quality improved (Stemple, Weiler, Whitehead and Komray, 1978).

Spastic dysphonia is another voice disorder whose origins are not clear (Perkins, 1977). There is speculation that spastic dysphonia may have a stress component in its origins. However, it is recognized that unless spastic dysphonia is treated intensively in its early stages, the disorder becomes resistant to treatment through retraining methods. Aberrant patterns of laryngeal muscle tensions characterize spastic dysphonia: audible vocal strain, breaks in phonation and sometimes a "choking" quality is noted in the voice. Control over voice is very difficult for the spastic dysphonic. Normal voice is usually not sustainable and is achieved only through substantial concentration on the part of the client.

Here is a tape-recorded example of spastic dysphonia. This case was a 44-year-old male who established good voice quality through therapy. This case is particularly interesting since good quality voice was eventually established through surgical intervention.

Note in this tape sample the characteristics of post surgery speech. The surgery involved severing the right recurrent laryngeal nerve and produced a paralysis of the right vocal fold. Excessive tensions that were previously manifest during adduction of the vocal folds were now not attainable. Effective voice was established when the deviant tension patterns were broken through surgery.

I believe it is particularly noteworthy that relaxation procedures, either a standard form of deep muscle relaxation or a form of functional relaxation, were not effective in establishing lasting normal voice in this case or other similar cases.

There is another serious speech disorder which is often associated both in theory and in the popular view with stress. The disorder is stuttering. While there is little hard evidence that supports an interpretation of stuttering being caused by stress, it is clear that stress normally increases the frequency and duration of stuttered instances. Stuttered speech is characterized by repetitions, prolongations, phonatory blockage and disturbed respiratory patterns (Webster, 1978).

The problem normally begins before age seven. If it persists through approximately age twelve, it is usually permanent. Traditional therapies show approximately 25% effectiveness.

For the past twelve years, my colleagues and I at Hollins College have been working on the development of a therapy program for stutterers. The program has been used now with over 1,000 cases and normally produces 90% of the treated cases speaking with normal fluency and transferring normal fluency to everyday situations at the end of the three-week training program. Long-term follow-up data indicate that approximately 70% of the treated cases sustain normal levels of speech fluency and normal reactions to situations which require speech.

Here are several samples of cases treated in our program:

MALE - AGE 40

PRETREATMENT		POSTTREATMENT		FOLLOW-UP (3 1/2 YRS)	
% disfluent/Reading	45	% disfluent/Reading	0	% disfluent/Reading	0
% disfluent/Conv.	80	% disfluent/Conv.	2	% disfluent/Conv.	0
Total PSI	51	Total PSI	7	Total PSI	5

MALE - AGE 38

PRETREATMENT		POSTTREATMENT		FOLLOW-UP (2 YRS)	
% disfluent/Reading	42	% disfluent/Reading	0	% disfluent/Reading	0
% disfluent/Conv.	36	% disfluent/Conv.	0	% disfluent/Conv.	0
Total PSI	27	Total PSI	5	Total PSI	5

MALE - AGE 9 1/2

PRETREATMENT		POSTTREATMENT		FOLLOW-UP (3 YRS. 10 MO.)	
% disfluent/Reading	28	% disfluent/Reading	1	% disfluent/Reading	0
% disfluent/Conv.	39	% disfluent/Conv.	2	% disfluent/Conv.	0
Total PSI	no score	Total PSI	no score	Total PSI	1

The key to effective stuttering therapy in the development of our program was found in the identification of a series of target behaviors involving the specific muscle gestures used in articulation, phonation and respiration. These target behaviors "normalize" the complex gestures of speech. In particular, the acquisition of correct voice onset behavior is central to successful therapeutic outcome and to the long-term retention of fluency.

I will not elaborate further on the details of the program in this presentation since I did just that at the Annual Meeting of the A.A.A.T.C. in October, 1977. Note, however, that the work involves establishing the systematic functional relaxation of speech microbehaviors. We have not found a generalized relaxation training approach to be particularly effective in the treatment of stuttering.

It appears to me that there is a substantial opportunity for the investigation of stress effects upon speech. There is not yet a body of literature which deals specifically with this topic. There are few journal articles and relatively few texts which attempt to explicate the role of stress as a variable in speech disorders. Those that do rely upon anecdotal reports and the "plausible supposition". The appearance of modern research tools such as the speech spectogram, the glottograph, EMG and the computer should enhance our descriptive and analytical skills in assessing tension effects on speech. There is already a surprisingly effective effort based on inverse filtering and computer analysis of speech signals which has resulted in identification of laryngeal pathologies from standardized tape recordings (Davis, 1976).

We are just now arriving at the threshold of new approaches to the understanding of stress in speech. As our research tools improve, our knowledge of relaxation increases and we begin to focus more on the functional characteristics of different muscle groups used in speech. I expect to see exciting developments in: 1) our understanding of how tension influences speech, and 2) the methods used to treat such disorders.

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Hypnosis as a Method of Relaxation and Tension Control

by

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Hypnosis is a method of healing that has fascinated people since antiquity. It is a state of concentration and relaxation, and of profound absorption in imagery and fantasy. In this state, suggestibility is heightened. But what is more important, there is also in this state the ability to make close contact with one's unconscious and to bring into awareness and understand materials that in the waking state are excluded from consciousness.

In the following I shall talk about a number of methods which we, the hypnotherapists, use in helping our patients control anxiety and tension. They range from simple and artless hypnotic and post-hypnotic suggestions to the highly sophisticated methods of hypnoanalysis, that is, the application of psychoanalytic principles of therapy during that altered state of consciousness which we call hypnosis.

Progressive Relaxation

One of the most widely used techniques in the hypnotherapy of tension is Jacobson's Progressive Relaxation technique, which we have simply taken over from Dr. Jacobson, (1938), the founder of your association, and to which we have added hypnosis. That is, while the patient is in trance, or is entering trance, we ask him to relax one muscle group after the other until his body is quite limp. Then we teach him self-hypnosis and ask him to practice Progressive Relaxation regularly at home and in his office a couple of times a day, or twenty times a day, depending on the nature of the case.

We are most grateful to you, Dr. Jacobson, for having invented this method, and we use it a great deal.

Direct Hypnotic or Post-Hypnotic Suggestion

The simplest method, the least artful one, is that of direct hypnotic or post-hypnotic suggestion. The hypnotist allows the patient first in the waking state, and then, after induction of trance, in the hypnotic state, to talk about his anxieties and to describe his tensions. He then suggests that, for instance, with every breath he inhales, the patient will feel calmer and calmer; and/or that with every breath he exhales more and more of his tension will flow out and away from him. The hypnotist may say "and you can just let that tension float out of you." When the patient is visibily

more calm and relaxed in the trance state, the hypnotherapist may say to him that he now can take the calmness, this good feeling, into the waking state with him, and keep it with him for some time to come (thus leaving it to the patient for how long he will be free of tension).

The next time the patient comes the hypnotherapist will, of course, inquire about the length of freedom from tension. If the direct suggestion has worked, let us say for two days, the hypnotherapist may reinforce it in the hypnotic state again and tell the patient that it will progressively last for longer and longer times. He may also exclude this suggestion from the patient's consciousness; that is, he may tell the patient that he will forget the hypnotist told him that he could be more and more free of tension. The purpose of "repressing" this suggestion is to be sure to push it into the unconscious, because it will work better then.

Frequently such direct suggestions do not work. They bring up resistances. Tension, like any other symptom, has a purpose. It is a defense against some unconscious forbidden wish, or a punishment for such a wish. Therefore, if we try to relieve the patient of this punishment or defense, frequently resistances are involved. He will not let go of it because it serves a dynamic purpose.

A manic-depressive patient who no longer could be treated with lithium because she had a kidney disease, was referred to me for hypnotherapy. She was a 70 year old woman, Jewish, a survivor of the Nazi holocaust in Europe. She was tense, agitated, and talked incessantly. She was fully aware of her manic and depressive episodes, but felt she could not do anything about them. They "came over" her, against her will.

She was a good hypnotic subject and she quickly went into a relatively deep state of trance. In it she told me she wished she were like me, "so strong, so calm and collected." She asked me whether she could hold my hand. I took her hand into mine, quietly, for awhile and then said to her "and now you can feel how a good deal of that strength of mine, and that calmness . . . and the collectedness is flowing from me into you, through my hand into yours, and is spreading all over your body and your mind. You can feel it spread into every pore of your body. Your bloodstream carries it into your brain, your arms, your legs, and all of the rest of your body. You can take it with you and keep it. Keep it for good and forever."

The patient calmed down markedly. The daughter with whom she lived reported that she talked much less and was much less of a strain at home. Although a good deal of work still needed to be done in the next three or four hours that I saw her, this simple suggestion that she borrow strength and calmness from me (i.e., that she could identify with me) set her on the road to recovery.

Indirect Suggestion, Hypnotic and Post-Hypnotic

In order to circumvent resistance, we frequently give indirect suggestions rather than direct ones. Indirect suggestion works better; it evokes less defensiveness. For instance, instead of saying to the patient that now

he can let the tension go (a direct suggestion) we might describe to her while she is in trance that she now sees herself undressing leisurely in her bathroom, then steps into her bathtub filled with a warm fragrant bubble bath solution, and that she luxuriates in that bathtub for quite a while. No word about tension. The mere image of sitting or lying in a bathtub filled with warm water, bubbles, or a soothing solution, brings with it a feeling of relaxation, indirectly suggested. We can teach the patient to induce self-hypnosis, that is, the induction procedures, and tell her she should practice that and the image of luxuriating in a beautiful bath two times or ten times everyday; if she asks, we may tell her this is a means of aborting tension attacks.

Methods to Teach the Patient Ego Activity Rather Than Being Overwhelmed by Anxiety and Tension

Emotional tension is due to fear, or to the feeling that one is not master of one's destiny, has no "free will," cannot make choices.

Partialization

Frequently people get overwhelmed by tension and anxiety because they feel the problem they are facing is so big that they cannot do anything about it. The hypnotherapist then can help them by urging them to cut the enormous whole into manageable parts, which can be discussed and worked with. The same method, of course, is used in certain psychotherapies in the waking state, for instance in Felix Deutsch's and William Murphy's (1955) Sector Therapy or in Helen Perlman's "Partialization" method. The purpose of these methods is to gain a realistic grip on the problem and to help the patient master, piece by piece, what disturbs or frightens him.

"Realistic" Rehearsal in Fantasy

Another way by which we can help a patient conquer his fear, is "Rehearsal" in fantasy. Let us assume the patient has a phobia: a fear of flying or an examination fear. In such cases it is often very useful that the hypnotherapist vivify to the patient in great detail the expected procedure he will have to go through in real life, and rehearse it with him in fantasy in minute detail.

For instance, to the patient with a flying phobia one may describe how he gets up in the morning, shaves, puts his airplane ticket into his pocket, drives to the airport, checks in his baggage, goes through the security check which will help him have a safe flight, sits for a little while in the waiting room relaxedly reading his newspaper, then enters the plane and makes himself comfortable in his seat, fastens his seat belt, and pulls out an entertaining book to read.

"Now" the hypnotherapist continues, "the plane is ready to leave. It is taxiing toward the runway. You see four or five planes ahead of yours on the runway. All are flying off safely into the air. Now it is time for your plane to fly off safely."

"As your plane rolls down the runway gathering speed for liftoff, you lean back in your chair, close your eyes, take a deep and relaxing breath and go into a state of trance." This last sentence, of course, is a post-hypnotic suggestion that the patient at the moment of the real takeoff should go into a hypnotic state of relaxation. There were other suggestions saying how natural and comfortable and safe a plane ride is.

The hypnotherapist may continue that after the plane is safely up in the air, the patient's eyelids will automatically open, he will be able to read, to talk, to eat, or to get up as he pleases, and feel good and comfortable about it.

It may be necessary to rehearse this type of fantasy a couple of times, maybe four or five times, before the patient is willing to give flying a try in reality. Once he has done that, he usually is more or less cured of his phobia.

If he is not, one needs to go into deeper layers of the unconscious symbolic meaning of the flying, such as for instance, the fear of "getting to be up higher in the world" than his parents, were, i.e., competitive feelings with his father or mother which need to be analyzed, and of which the flying fear can be a symbolic expression.

Symbolic Rehearsal of Mastery in Fantasy

As in hypnosis we talk to the unconscious of the patient directly, we often must use the language of the unconscious -- symbolization and imagery -- as they appear in dreams.

Thus, if we want to convince the patient that his tension is something he can learn to master, that it is not a totally insoluable problem, we may evoke in him a fantasy of, for instance, climbing a mountain. We let him choose whether he wants to take the steep, short and hard way, or the longer, easier road.

Or we may engage him in a fantasy in which he is at the bank of a river where it is dark, gray and dreary; but on the other side of the river the sun is shining, people are having a good time, and life is much more carefree. We may urge him, in his fantasy, to swim across a river, telling him that this river has something to do with his problem. And we may describe that it is not easy, though possible, do swim across the first time in order to stay on the warm sunny side of the river. But I will also say that I, the hypnotherapist, will be in a boat, accompanying him, a boat into which he can always climb and in which he can rest when the swimming gets too tough. I will make it quite clear, however, that is is he who must master his fear, by saying that the boat will not carry him to the other bank without his rowing; he must swim or row on his own strength. Only when he learns that he can do it on his own strength, will he trust that he can be the master of his own fate.

Symbolization of Unknown Good Potential and Inner Strength

Symbolically showing the patient that he has inner strength with which to master the tension and the anxiety that troubled him, can be done in many different ways. One of my favorite ways is to use a fantasy telling the patient that he and I walk down a beautiful staircase covered with a thick soft rug, towards a room of his own which is a room of relaxation. After entering that room and relaxing in it for awhile, I will then suggest that the room has French doors that open outward towards a beautiful park landscape with big, strong, century old trees that have weathered many a storm.

When the patient has indicated that he is in that park landscape and that he can see these beautiful old trees, I will ask him to walk up to one of them; one that is so big that he can barely encircle its trunk with his arms. I tell him to put his arms around that tree trunk and then say that he feels something very strange happening to him now. His feet will feel like the roots of a tree and grasp deep down into the earth; he can feel the sap rising from the earth, rising in the tree trunk which his arms are encircling, and rising up in him. The sap that is strength, the sap that has helped the trees to weather many a storm, this sap will give inner strength to him, too.

Letting Go

One can approach the control of tension through the pathways of mastery; one can also approach it through those of "letting go." When anxiety is no longer of "signal" value, the hypnotherapist may use imagery to help the patient free himself from the yoke of unnecessary anxiety.

For instance, he may suggest to the hypnotized patient that the patient is lying on a sunny beach, and that not far away from him there stands a great big, white, plastic container marked "Trash". The container has a lid that shuts it tightly; and a handle that forms an arc across the cover. Fastened to the handle is a large, red, shiny balloon, which very soon is going to be filled with helium.

The therapist then urges the patient to gather all the tension that is in him and to walk over to the plastic container and throw into it all of the tension, or as much as he thinks he can "do without." The therapist lets the patient describe how he walks over there, and encourages him to "bundle up the tension" and throw it into the large container. The therapist also has suggested already earlier, or can suggest now, that as soon as the tension is in that container the patient should clamp or screw on the cover tightly.

As soon as the cover is on tightly, he will see the balloon rising up higher and higher into the air with the plastic container floating and trailing after it until it is so far up that the patient can barely see it. At that point, the hypnotherapist says the patient can wave goodbye to it and to what he has thrown into the container. Goodbye for good.

The therapist reinforces this by saying that the patient now no longer needs that tension and really can let it go out, into the yonder, let it vanish, let it dissipate itself in Outer Space.

In a similar technique one can simply suggest to the patient that he throw the tension behind himself, back over his shoulder, "throw it out."

Guided Imagery

The use of imagery and imagination in hypnosis cannot be emphasized enough. The hypnotherapist skillfully has to involve the patient so much in his imaginary world that the patient really feels he is, for the moment, living in that imaginary world of his own symbols. When it comes to irrational fears with resulting tension, suggestion without imagination rarely leads anywhere. Through guided imagery in hypnosis the patient can learn that he can slay his inner dragons, and emerge in real life as a free man.

Hypnoanalytic Techniques

When the techniques of guided imagery in hypnosis, and of post-hypnotic suggestion, do not bring the desired result of tension control, we turn to hypnoanalytic methods. Psychoanalysis attempts to uncover the unconscious reasons of tension and anxiety and to help the patient work through his conflict in the waking state. Hypnoanalysis uses the psychoanalytic methods of free association, dream interpretation, transference, and analysis of resistances, in the hypnotic state pretty much in the same manner as in psychoanalysis, to help the patient get insight and gain ego strength.

In hypnoanalysis we usually can help a patient much faster than in psychoanalysis. Psychoanalysis takes many years. What one can achieve in psychoanalysis in three years one often can achieve in hypnoanalysis in three hours, or in three months. The analysis of transference phenomena plays only a minor role in the hypnoanalytic treatment of tension control and thus shall not be discussed here.

Hypnosis is a state quite similar to the dream state. Both are altered states of consciousness. In hypnoanalysis we basically do two things: a) we try and help the patient uncover the unconscious reasons for his tension and anxiety and to work through the underlying conflict, and b) we attempt to help him gain greater ego strength and ego activity. That is, we help him to understand that he is not the passive victim of his own drives and impulses and passions, nor of the environmental demands, nor of his own conscience.

We attempt to help him understand -- both with his rational conscious as well as with his not so rational unconscious mind -- that he need not be passively overwhelmed by his tensions and fear, that he can be the master of his own fate, that he has choices, and that he actively can decide which way to go.

Dream Interpretation

Freud called dream interpretation "The Royal Road to the Unconscious." Time does not allow me to explain to you here how dream interpretation is done. However, let me say that the psychoanalyst has to rely on the patient's bringing dreams into the hour, and not forgetting or repressing them.

Frequently in psychoanalysis the patient comes in and says to the analyst "I had a very interesting and important dream last night, but unfortunately I have totally forgotten the dream."

The hypnotherapist can use the nocturnal dreams the patient brings him. But in addition he has ways of eliciting dreams. In the hypnotic hour he can suggest to the patient who often forgets dreams, that right here and now he will dream a dream that has some connection with his tension. And he can tell him that after the dream has been dreamed and reported, he and the patient will together interpret it. The hypnoanalyst thus can induce a dream right during the analytic hour.

He can also give the patient a post-hypnotic suggestion not to forget the dreams he dreams at home at night, and to bring them into the therapy hour to work on. In addition, he can suggest to the patient that consecutive dreams will show better and better solutions to his tension problem, solutions which the patient himself will be able to find.

It is important in these cases not to give the impression that one promises heaven on earth, that is, not to say to the patient, "in your next dream you will find the total solution to your problem." If tension is a problem of some duration it cannot be solved in one easy lesson.

Free Association

Free association is a method that in hypnoanalysis (and in psychoanalysis) is always used in connection with dream interpretation. The patient is asked right after he has related a dream, to free-associate to that dream, that is, to say whatever comes up in his mind in relation to details of the dream.

Free association can also be used separately, without dreams. For example, a patient would become tense and would get what he described as a migraine headache whenever the slightest demand was made of him by anyone in his environment.

When I asked him to free associate, that is, to say whatever came up in his mind in connection with the headache, he described it first as a "ring of tension around the forehead." Then he talked of a medieval dungeon with a prisoner chained to the dark wall.

Eventually he said: "Oh, I just thought of a fairy tale I hadn't thought of since I was a child: the fairy tale of the princess who falls in love with the ugly frog."

Suddenly he became quite animated and described that the ugly frog is really a charming prince in disguise. The fair princess does not know this, but loves the frog and thus rescues him from having been changed into a frog by a bad fairy. The princess' love restores him to being a prince again.

The patient who consciously was aware of many feelings of inferiority eventually could be led to realize that he had an unconscious grandiose, narcissistic fantasy of being a prince; and that the ring around the head represented his invisible crown. When he understood this, he could "abdicate" the crown, laugh about it, and thus no longer needed to have tension headaches.

Age Regression

Another very important technique for tension reduction and control is the method of age regression, a specialized and interesting method of hypnosis. The patient is being told that he is getting younger and smaller, and he is going back, back, back in time to an earlier time of his life when he felt just as tense as he does now.

It is best to combine this request to become younger and smaller with the imagery that the patient is going back along a rope or over a bridge of the affect of tension that he now feels, until he gets to such a point in his earlier life in which he felt just like this (Watkins' Affect Bridge, 1971).

If the patient is a good enough hypnotic subject, he indeed goes back to this earlier time, so much so that he feels himself living in that time period, as a child or as an adolescent, whatever the case may be. We then urge him to go back to other childhood periods in his life in which he felt similarly.

This is done with the knowledge that a neurosis is only very rarely due to a single traumatic experience, but rather to repetitive experiences, in which the patient felt anxious, tense, and overwhelmed. We can then proceed to show the patient that what he was afraid of in childhood, when his ego was much weaker, he perhaps need no longer be afraid of now when he is more mature, stronger. But that he has carried with him these fears and tensions from childhood, that they are symbolic acts related to childhood fears which he now can throw out or face with courage and self-confidence. Age regression thus is used for uncovering the roots and unconscious reasons for the tension, to become aware of their lack of relation to his current reality, and thus to let go of them.

Sometimes in order to help the patient master the tension, we use an imagery device which I shall call the calendar technique. It is a device that helps the patient's unconscious to set a time for himself by which he will be free of tension.

When the patient is in a hypnotic trance, we describe to him that he sees a calendar hanging on the wall, a calendar that has a whole month on each leaf. We then suggest to him that he imagine the wind blowing in through the open window, roughing up the leaves of the calendar which has all kinds of red letter dates on it.

At one point the wind becomes steady and holds the calendar fixedly in a position which shows a particular month with a particular red letter day "the day on which he will be rid for good of all of his pathological tensions." We ask the patient what he sees -- what is the month and the day? We thus leave the choice up to him. He can set the date of his own full recovery. This gives him a goal to work towards or to work for, and involves him in the active process of recovery.

There are many other ways in which we can stimulate the patient in hypnoanalysis to use his own integrative and coping ego mechanisms to combat and master tension.

Ideal Self Technique

While the patient is in a medium to deep trance, he or she is asked to visualize or imagine that the door is opening to admit a person who looks very much like him but is fully at ease with himself and can do all the things he, the patient, would like to be able to do. This person -- let's call her Melissa -- is best described as the patient's ideal self, the person the patient would like to be.

Melissa, the hypnoanalyst says, now sits down on the other end of the couch on which the patient sits. The patient is told that she feels an insurmountable urge to merge into the body of Melissa, as if a magnet were pulling her into Melissa's body.

Now let us assume that the patient, a woman, has an agoraphobia, a fear of going out on the street. Even the thought of leaving her house throws her into a panic and she has become a virtual "prisoner" in her own house. So, we describe to her that Melissa -- with the patient inside of her -- goes out on the street, walks a few blocks down to the beach, relaxes there and enjoys herself, talks to people she knows there, then walks to the grocery store, does her shopping, and walks home.

All the while the patient can look out from inside Melissa and enjoy being out of her house.

The next time we may go further and have the patient go out hand in hand with Melissa. The following time we may urge the patient in trance in a guided fantasy to walk out of the house and across the street while Melissa looks on encouragingly; and so on. And after that, we suggest she does it alone.

Each time we let the patient describe the tension level and go a step further only if the tension has decreased through the exercise of coming closer and closer to the ideal self, that is, becoming really the person she wants to be.

As in nearly all hypnotherapeutic and hypnoanalytic techniques, imagery plays a great role, the more imaginative the hypnotherapist is and the more he can build into his patterns the patient's own imagery, the more likely he is to succeed in helping the patient to become well.

I have attempted to give you a short overview of methods and techniques hypnotherapists use to help their patients control tension. Let me reiterate that the technique we use most commonly is the Progressive Relaxation technique, invented by the founder of your organization, Dr. Edmund Jacobson. We feel that in the altered state of consciousness which is called hypnosis, it is perhaps even more effective than it is in the waking state. But that may be the hypnotherapists' bias.

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APPLICATIONS OF TENSION CONTROL TO EDUCATION

by

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Epidemiologists tell us that our diseases reflect the times, so what are our times? We live in a mechanized, urbanized, crowded, noisy, stimulating, production-oriented , time conscious, competitive society in which the range of choices, literally, brings on neurosis.

It is ancient knowledge that the way man lives determines the diseases to which he falls prey. Most physicians agree that anywhere from 50 to 80 percent of medical and/or gynecological problems are stress-induced or stress-exacerbated. In 1977 there were more than 100 million prescriptions written for Valium, presumably to interrupt the physiology of the stress response.

Of the four major elements determining health, all are implicated in physiologic reactivity to perceived stressors. Genetic predisposition, such as homeostatic lability, potentiated renders that individual vulnerable to stress effects. Environment includes those societal descriptors already mentioned, that is, external factors not really controllable (or avoidable) by the individual. The strong psychogenic factor in the third element, i.e., personal behavior or lifestyle, is reflected in mortality statistics for young males in which accidents rank first followed by homicides and suicides. The growing recognition that the common denominator in our preventable morbidity and premature mortality is individual behavior or lifestyle mandates the teaching of less destructive ways of behaving, literally. And the fourth element is the "too much, too late" health care system representing the medical model of treatment and rehabilitation. Nowehere is calmness more appropriate then here.

The mosaic of these four elements is health. With lifestyle and genetic factors compounding inappropriate responses to the environment, and the failure of the health care system to educate, the population at risk (high risk) is enormous: conceivably all adults. In this respect, continuing education programs have a guaranteed clientele. The 5 to 14-year-old group is generally considered low risk because of its decreased morbidity and mortality rates. But during this time habits and attitudes are formed that will determine their future health status. Ironically it is these habits and attitudes that will allow youth to become high risk adults.

The notion of self-responsibility is a basic tenet of the holistic health movement. The "old me" is the expectation that, "when I am sick, the physician will do something to me or for me and make me well." The "new me" appreciates the role of behavior in health status and that "I am an active participant in my getting sick, in my getting well, in my staying well and in achieving high level wellness."

Taking care of oneself and assuming responsibility for one's own health now and in the future requires some skills--self-care skills. Attributes of all cultures, self-care skills, are universal. But our incredible technological advances and associated psychosocial changes have outdated our self-care skills; that they are inadequate is evidenced in the prevalence of stress-related disorders. Self-care skills would appear to be a legitimate focus of education.

Tension control, voluntary self-relaxation as a 24-hour habit, is a self-care skill. Relaxation training is the acquisition of a self-care skill to better equip the individual to become an active agent in his or her own health care. This non-clinical application for "well" people in general and "well" children in particular would seem to be a legitimate function for education.

Moreover, tension control has to do with the whole effort continuum from zero to maximum effort, so that nothing is excluded in terms of potential application. Movement behaviour in motor skills and its absence in high-quality rest are self-evident, but we know also that mental activity has a measurable energy cost with implications for reading, writing, concentrating, remembering, decision-making, creative thinking, and other cognitive activities.

The 1978 Pennsylvania Education Quality Assessment and the recent Gallup Poll of public attitudes toward schools reported that generally, parents felt that teachers should be doing a better job of helping children learn. Teachers criticized students for poor study habits and parents for not valuing education and supporting children in homework. Both criticized each other for their lack of mutual communication.

The parents' pressure for back to the basics, particularly in reading, brought to mind Danskin'sresearch at Kansas State University presented here last year. He described a non-problem, health-oriented study: approximately 50 students in a 10-week biofeedback/relaxation training met three or four times per week and reported more than 64 positive changes. These changes were of the sort with significance for the classroom: study longer, ↑memory, ↑concentration, more relaxed for exams and speeches, ↑self-confidence, ↑creativity, better able to use talents, ↑ability to make decisions, ↑energy level, ↓worry time, ↑perceptual flexibility, ↓sense of urgency, ↓startle reaction, and improved sleep patterns. The point of the study was voluntary self-regulation in one's daily life. It was gratifying to hear Charles Stroebel, MD, in the presidential address to the Biofeedback Society of America (BSA) Annual Conference in Albuquerque last year noting the "back to basics" plea for education and calling for a fourth R - RELAXATION.

The Pennsylvania Department of Education spent two years working on eleven revised goals of quality education. Public hearings are scheduled for November and December through the state with action slated for January. These goals advise schools about the sorts of things schools should be doing. Two goals have direct implications for tension control/relaxation training; namely:

"HEALTH & ENVIRONMENT": Quality education should help every student acquire knowledge and develop practices to maintain physical well-being and a healthful and safe environment.

"SELF-ESTEEM": Quality education should help every student develop self-understanding and a feeling of self-worth.

There are a growing number of studies with young people using biofeedback training in combination with relaxation training reporting ↑self-awareness, ↑self-regulation, ↑self-responsibility, new self-direction and self-development which embody in the latter goal, the concept of internality or Internal Locus of Control (vis-a-vis, externality). Additionally, tension control and relaxation training are indirectly implicated in those goals relating to "Communication Skills"; "Critical and Original Thinking"; "Understanding Others"; "Work"; and "Family Living."

Where in the curriculum can we teach students to derive these potential improvements in self-awareness, self-regulation, self-responsibility, self-direction, and self-development? Where in the curriculum can we teach students to count the cost of accomplishment? As Thoreau put it, "the cost of the thing is in the amount of life to be exchanged for it now or in the long-run." Where in the curriculum can we teach students they don't need to be (passive) victims of internal/external events but can learn to change habitual reactions to stressors which take away from performance and inhibit self-realization?

Where in the curriculum can we teach students "body awareness" to better match (their) effort expended to (the) task demands for (purposes of) efficiency and personal energy conservation? Where can students learn to recognize the earliest signs of the stress response so that they may banish. or at least modify, such behaviour as irritability, over- or under-eating, smoking, gastrointestinal symptoms, headaches, sweating, hyperkinesia, inability to concentrate, uncontrollable feelings of wanting to cry, "jumpiness," unreasonable fatigue, and, what you might expect after even some of this exhausting but inexhaustive list,--loss of joie de vivre!

There are two obvious and currently available places in the curriculum, both largely undeveloped.

The first opportunity lies in health education. I have watched the topic of stress creeping into the college texts. At first it was mentioned (sometimes) as a risk factor in coronary heart disease. Then it had a heading of its own; Selye and a two- or three-line inept explanation of his General Adaptation Syndrome along with reference to Holmes and Rahe's Social Readjustment Rating Scale were it. Rarely was management even alluded to!

The situation is improving now. The nature, effects, and control of stressors as a topic deserves a place of its own in the health curriculum. Its role here is that of education for disease prevention, for health protection and promotion--helping students be more well.

Tension control/stress management can help students move themselves toward that end of the health continuum labelled optimal health. Students need to learn strategies to counteract the self-imposed risks and destructive lifestyles so that they might, thereby, improve their quality of living. With the new emphasis in health education on wellness and self-responsibility, it is the logical place in the curriculum to teach about the nature, effects, and control of stressors.

It is a new topic. "Death and Dying" has recently gone through such an evolution to become an accepted part of the health curriculum. Many health educators had had no course in it, nor had they the faintest notion how to present it in the classroom, but they tooled up for it!

The second (obvious and available) curriculum site for tension control/relaxation training is physical education, where efficient movement is directly applicable to motor skill learning and performance. Rather than being rehabilitative and/or preventive, the goals of tension control/relaxation training now become developmental in that the learned skills are applicable to sport, dance, combatives, academics, art, music, or childbirth--in fact, any performance whether it belongs in the cognitive, affective, or (the more patent) psychomotor domain.

Let me explain. In a physical education class it is not unusual to have a majority inexperienced in the motor skill being presented. Moreover, the students are "regular" people, i.e., they do not have gifted hands or feet. For varying reasons, some try very hard for mastery. Often "trying too hard" gets in the way of learning complex skills. Conversely, others don't try at all, with similar results.

Motor learning is progressive, active inhibition as a result of experience called repetition or practice. Learning motor control is not the addition of motor units but subtraction of motor units, i.e., increased inhibition down the spinal cord acting on the final common pathway at the anterior horn cells. As the performance is practiced and refined, inhibition is even greater. It has been suggested that it takes as long as 14 years for reciprocal activation of the golf swing! Seems inordinately long--perhaps they are referring to the "perfect" golf swing, whatever <u>that</u> is! But even simple movements are learned by repetition and progressive inhibition of motor units-serving-no-purpose. This is why top athletes look so graceful; their effort appears effortless. To speed up this progressive inhibition of motor units-serving-no-purpose is central to teaching and coaching motor skills.

Carol Johnson, teaching teachers with Bob Toski at the National Golf Foundation Seminars at Pinehurst, SC, introduces the sensation difference between tight and loose-but-controlled. Squeezing a correct golf grip tightly, students are asked to notice the loss of feel and true swing. Feeling and ease of swing return with the release of the tension. Not only beginners are tight like this at a first lesson. It is suggested that teachers might better spend time early on teaching students to loosen up and to discriminate between tension and relaxation. This is why former BSA President Erik Peper suggests that in beginning, intermediate, and even advanced tennis classes for the big guys who like to power the serve, the teacher first put a hard candy between the back molars!

There are many ways to identify motor units-serving-no-purpose. Swimming teachers who have tried to teach adults to swim understand. The rate of learning increases markedly with up to half the time spent out of the water with relaxation training.

To shortcut some of the unnecessary motor unit activation in teaching complex motor skills like the tennis serve, for example, progressions are used to build the stroke. (Students learn best from their successes, not from the failures, so progressions are simply small bits of the final product sequenced for success.) Moreover, football players taking up tennis because it is a lifetime sport often view the serve as the opportunity to really powder the ball. I commonly observe that the ball is way under-hit in comparison to their strength. They eventually come to understand that a loose-but-controlled, relaxed arm is a good serving arm but not a good drive arm. It is hard for these big, strong athletes to get the idea that all those activated motor units inhibit a nice, free, loose, flexible arm that will allow the racquet head to move three feet very fast, while the hand moves six inches to generate the torque essential to the serve.

Bruce Frederick, co-chairman of the Education Section of our association and here in the audience today, studied facial tensions of gymnasts in competition. His photographs provide provide evidence of unnecessary motor units-serving-no-purpose. The teacher can be on the look-out for signals of inappropriate tension for any motor skill, including reading and writing.

We can only speculate how much easier it might be to teach the loose arm in the serve, contrasted to the power arm in the drive, against the weight of the oncoming ball or how much easier it would be to teach the loose recovery-phase arm in the crawl versus the power arm in the pull phase against the resistance of the water had the student had some general and differential (dynamic) relaxation training experience from which such applications could be made. Unfortunately, no systematic studies have been done.

A case can be made for relaxation training, general and differential (dynamic), as a distinct and separate part of the physical education curriculum. Just as gymnastics, volleyball, basketball, lifetime sports, physical fitness, and so on, are separate components, likewise relaxation training. For every grade, the progressions are spelled out in each area so that it is not for example "Beginning Tennis" forever. Similarly, there should be beginning, intermediate, and advanced relaxation training. The overall objective, efficient movement and conservation of effort, is achieved in similar fashion to other motor skills by providing 1) a clear mental picture of what to do and how to do it and 2) a clear understanding of how to practice; and 3) building the skill through progressions.

Practice can be integrated into a "knowing" class by using it. Before performing a stunt, spot-check for unnecessary tension; before serving the next point, check shoulders, jaw, arm. Following a good demonstration, visualize "you" doing it so that you program your body; or before the class leaves the gym, "get yourselves under control", that means the next teacher meets a calm class rather than an aroused mob!

Coaching provides a logical extension of all the foregoing. First, efficiency is more critical at these higher levels of performance where excess tension signals signify error and wasted effort. This brings to mind the coach's suggestion to his Olympic calibre sprinters in California that they relax the jaw and run with 4/5 effort. To their amazement, each was associated with faster sprint times. The exquisite matching of effort expended and task demands that characterize top athletes have moved observers to describe the performer and the spectacle as "poetry in motion"!

Second is the stress management role. For athletes whose habitual reaction to the competitive situation is damaging to their performance, it is important to find ways of changing that response pattern. A finely-tuned motor pattern can become spastic if over-activity in the skeletal muscles, including neuromotor pathways specific to the performance, as part of generalized hyperarousal, fails to be offset by adequate inhibition.

The performance decrements and psychophysiologic sequelae accompanying unrelieved competitive anxiety are well documented. Mental preparation of athletes otherwise equally matched can make the difference between winning and losing. The team psychologist is not a new phenomenon for East European athletes. Wentz and Strong in California used biofeedback training, relaxation training, and autogenic phases with a group of top synchronized swimmers and track and field athletes preparing for Nationals and Olympic trials respectively. They reported a shift in the athletes' locus of control toward internality accompanied by a marked improvement in interpersonal relationships with each other and with the coaches, and greater subject responsibility for performance. In addition, performances improved!

It is imminent that such training will become an integral part of an athlete's preparation. At the AAHPER Annual Convention in Kansas City last year Dr. Dorothy Harris, a member of the U.S. Olympic Development Committee, stated that the committee would probably choose relaxation training methods.

Another use of relaxation training in coaching (high level athletes) was publicized rather recently by Richard Suinn, team psychologist for the U.S. Nordic ski team. Suinn combines profound muscle relaxation with detailed performance imaging, which is "old" mental practice revitalized and renames visuomotor behaviour rehearsal (VMBR), to enhance athletic performance.

This (diminished) activation of key neuromotor patterns in miniscule or covert form is a programming of the body through clear mental pictures. Modern coaching has not capitalized on this mini-practice.

With the increasing sophistication and investment in athletic programs, more schools have athletic trainers. The role of conditioning the injury prevention and control is well established. For example, muscle endurance is a training component because fatigued muscle tends to spasm. This in turn reduces the joint range of motion thereby increasing vulnerability to stretch injury. Similarly, hyperarousal which sometimes accompanies competition can increase tension in muscles, not only reducing the effective range of motion directly, but also causing muscles to fatigue sooner. Speaking of spasm, some students in my tension control class can relax away hiccoughs, the "stitch," foot cramping in ski boots, sneezes, and other annoying bits of behaviour!

Relaxation training, in addition to these involvements for health education, physical education and coaching, might well be dispensed by the school nurse, school counselors, the "home room" teacher, and any and all teachers. School personnel, with a clear understanding of what students are learning in relaxation training, are in a prime position to reinforce tension-controlled behaviour and to guide practice and application. Voluntary self-relaxation as a 24-hour habit to match effort and task might well become reality. If relaxation and related behaviours improve athlete-coach relationships, would they not do the same for student-teacher relationships, and thereby enhance classroom climate?

I am not including in this presentation the possible treatment roles for relaxation with exceptional students such as the cerebral palsied, emotionally disturbed, hyperactive, diabetic, etc.

Having exposed relaxation training in the school curriculum where it has been successfully hiding all these years, the next concern is related to implementation: "Where do the teachers get their knowledge and skills?"

The responsibility lies with the teacher training institutions. Scanning a normal list of undergraduate professional courses in a typical health and physical education program preparing health educators, physical educators, coaches, and athletic trainers, identifies many possible places for topical development but no course distinguished by title.

While not a comprehensive list, the following course titles suggest possible attention to at least some aspect of (the nature, effects, and control of) stressors and relaxation training:

Exercise Physiology
Health Education Content courses
Health Education Methods/Materials courses
Athletic Training I & II
Psychomotor Development
Motor Learning
Adaptive Physical Education
Psychology of Sport
Elementary Physical Education
Secondary Physical Education
The High School Curriculum in Health & Physical Education
Coaching Methods
Adult Fitness & Cardiac Rehabilitation
Activity Programs for Senior Citizens . . .

Where will majors in programs of early childhood, elementary education, secondary education, curriculum and supervision, counselling education, and educational administration get their exposure to the nature, effects and control of stressors? Where will the school nurses and others in the health care delivery system get their knowledge and skills?

Such a course can be developed to meet established academic standards just like any acceptable course. A course description would include, for example: a rationale statement; course objectives in the cognitive, affective, and psychomotor domains; readings: required texts, recommended readings on library reserve; course outline of lecture topics, laboratory practicum, assignments; course evaluation: mid-term/final written examinations, laboratory practicum, assignments, class participation, etc.

In one research study, Sime, University of Nebraska-Lincoln, used a content course final exam as a real life stressor in monitoring selected physiological variables. I would go further and use selected variables as evidence of learning and therefore criteria for the practical grade. Unfair? In a math class, some enter more experienced than others, some are brighter than others, some work harder than others. Improvement is not the criterion, attitude is not the criterion, but how well did he or she do on the test is the criterion. An "A" grade for gymnastics might be eight tricks performed according to clearly specified reference criteria by the end of the gymnastics segment. Since students, for various reasons, will spend time practicing--why not? Thus our course can be very much like any other course in its organization and rigor.

Will the teacher training institutions teach about research in relaxation training? Probably not, particularly if relaxation training/stress management is not encompassed in some form in the graduate program. Unfortunately, much needs to be learned about acquiring voluntary self-relaxation whatever the purposes. Variables as basic as practice schedules, duration and frequency of training; sex, age, motor skill, and fitness differences; expectancy, generalizations, learning conditions, transfer of training, and behavioural changes demand further investigation. Working familiarity with the various standard checklists, scales and self-report techniques is needed to hasten the development of situation-specific tests and criteria. The overall research need is very clear. The mandate is evidence to link relaxation as a daily habit and mental/physical health status on the one hand and performance on the other.

You know all this, so what is my point? Ron Webster of Hollins Communications Research Institute said earlier today that the treatment for functional dysphonia is not well standardized. Is relaxation training standardized "out there"? Compare it to tennis: the fundamentals of tennis are the same whether you are teaching a 10-year-old or a 60-year-old! The fundamentals of tennis are the same whether it be Boston or San Francisco, i.e., the what of tennis is the same, but the how varies with the needs, interests, and abilities of the learner and the personality and skills of the teacher. This "how" has the academic freedom to vary.

Teachers go to workshops to improve the "what" or the "how" or both. In comparison, stress management/relaxation training is hardly systematic in its approach.

My plea to you, the Education Section, is rather than sit here and talk about our special interest in stress management/relaxation training, let us identify the applications to education and the implications for teacher training institutions.

Perhaps we, the Education Section, should function like the Sex Information & Education Council of the United States (SIECUS), as a resource with a president and a board to develop position statements. Perhaps we should write critical reviews, and organize an attack across the country to gain acceptance of the notion that voluntary self-relaxation as a daily habit has value to humanity. Our aim is a population that will use this learned skill for preventive and developmental purposes.

Or we might act like the Education and Research Center of the United States Tennis Association (USTA), in Princeton, NJ. The Center bills itself as the nation's headquarters for tennis information. The staff is comprised of a team of expert tennis teachers, administrators, writers, and researchers. Their services include acting as a clearinghouse for tennis information, a publications department with a comprehensive mail-order bookstore on wide-ranging tennis subjects and audio-visual service including instructional films for rent or purchase. The USTA holds teacher training workshops with the annual National Tennis Teachers Conference in conjunction with the U.S. Open as a meeting place for leading tennis teachers and would-be teachers from across the country. It has clinicians' services which recommend qualified consultants for 2-, 4-, 6-, or 8-hour clinics, or two or more days. An extension of this is international in cooperation with the U.S. Department of State to promote overseas tennis. And then there is the development program to advance grass roots tennis programs in schools, parks, clubs, inner city, etc. Finally, there is continuing research into aspects of tennis and its dissemination. What a magnificent model.

We must get our show on the road. We must streamline our operation and saturate the market with "what, "why", and "how to". We should procure a spot on the program of every state health, physical education, and recreation meeting and those of the associations of school nurses, athletic trainers, early childhood, elementary education, secondary education, higher education, and the American Educational Research Association. The one place I have seen topic development is at the sport psychology meetings.

The President's Council on Physical Fitness & Sports regional workshops have lifetime sports, physical fitness, strength training, and flexibility training represented, but where is stress management and relaxation training? If we can't sell these organizations on our viability we had better give up.

We should be consultants to the National YMCA Adult Fitness and Cardiac Rehabilitation program. It should be unthinkable that they can feel comfortable without our services!

Relaxation training should figure prominently pre- and post-exercise for the American College of Sports Medicine Guidelines for Exercise and therefore, for the Exercise Leader Certification program. It is not unusual to evidence increased sympathetic nervous system tone at the end of a hectic day. Add angry feelings, from whatever cause, and the stress of exercise for potential sympathetic overdrive and (fatal) cardiac arrythmias. Relaxation first, or chance the increased risk of sudden death, is the choice of the exercise leader.

The influence of anxiety on cardiovascualr variables such as heart rate and blood pressure in particular also have important implications for stress testing validity and safety, and consequently for the Exercise Technologist Certification program. And, unless the program director is attuned to the pertinent aspects of stress and stress management, it is unlikely that the topic will be afforded the appropriate attention.

Why aren't courses in stress and its management offered in our graduate schools of public health along with population control, noise pollution, environmental health hazards, and so forth? Is there not enough content or evidence or interest? Or have we abdicated our responsibility in presenting a solid course proposal?

We have not capitalized on our opportunities although others perhaps have, and we do not recognize it. After the short, practical introduction to my tension control class at the University of Pittsburgh, a student approached me to ask "are we going to do any more eutony?" Are we missing the boat or is it already too late?

Voluntary self-relaxation, tension control, at any time in any place as a 24-hour skill is elegant in its logic and deceptive in its simplicity. We need some guidelines.

The Canadian Government in the document, "A New Perspective on the Health of Canadians," suggests taking positive action (set out in 9 hypotheses). The Government feels that the population will use the present lack of conclusive evidence as an excuse for cultivating and tolerating a lifestyle hazardous to health and not changing behaviour. This is the prelude to hypothesis #7 which states: "Tranquility is better than excess stress." And there are 8 other classic understatements.

The individual's key to health is in lifestyle--the way one lives. If one has not learned to use one's capacities and built-in resources, that person might well feel cheated by public education. If one has not learned to offset tension throughout the day with the option to make that a way of life, then that person might well have been cheated.

Whether one elects to use the skill or not poses the crux of the discrepancy between theory and practice, between knowing and doing. Many adults do not want to change their habitual reaction to stressors any more than they want to change their eating and/or activity patterns even though those behaviours cause pain, illness, or at best, are destructive to their quality of living. The key is motivation for and commitment to self-participation in health and energy conservation.

The self-care revolution promises a healthier, longer life to those conscientiously joining it. "Self-Care--How To Do It" is the most recent Blue Cross Blue Shield free booklet. We in relaxation training and tension control cannot, at this time, promise longer life, but we can promise improved quality of life for those that choose. Isn't that what education is all about? America has the responsibility to lead the way because America is the hope for all people seeking quality in living.

The Alexander Technique
as a
Method of Tension Control

by

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The purpose of this paper is to discuss the Alexander Technique as it relates to tension control. At the outset, it is necessary to review the original personal observations of F. M. Alexander and the concepts which were deveoped therein. (1,2,3)

F. M. Alexander made his discoveries out of necessity, when as a young Shakespearian actor, he began suffering severe hoarseness. He sought medical help, but his condition worsened until, during an important engagement, he lost his voice entirely. At this point, he left his profession and devoted his efforts to his personal voice problem.

After a long period of introspection with extensive empirical observation, he discovered that his problem stemmed from the way he "used" himself during performance. He eventually defined the term "use"(2) to mean specifically the coordination of the whole psychophysical mechanism in the performance of any activity. The term "good use" meant allowing the body to move freely devoid of unnecessary tension or pressure. After determining that his voice problem stemmed from improper use, Alexander set up three mirrors and observed that facial, upper body, and lower extremity muscle activity was apparent while speaking.

Through intense scrutiny, he discovered that every time he began speaking he also pulled his head back and down, causing his body to slump and depressing musculature around the larynx. As a result, he gasped for air through his mouth. He observed that he could not prevent these responses until he ceased pulling his head back and down. In his attempts to correct this behavior through trial and error, he noticed that he also tended to lift his chest which increased the lumbar curvature, thus further shortening his stature.

The latter observation indicated to Alexander that his misuse was related to the whole body; not just the head and neck. Experimenting with this discovery he found that when he moved his head forward and up allowing his body to follow his head, there was a release of tension throughout his body. At the same time, he ceased to either slump or to lift his chest. Thus Alexander was convinced that good use involved realigning* the head and neck in relationship to the body.

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*Hereafter, the act of moving the head forward and up and allowing the body to follow will be referred to as realignment. The use of this term, however, in no way implies that static or rigid body positioning occurs in the Alexander Technique.

Further experience proved that realignment was necessary for improvement of performance in all activities.(3) However, when Alexander attempted to apply it to an activity he automatically reverted to a back and downward movement of the head. This phenomenon occurred even when he felt that he was moving his head forward and upward. Therefore, he reasoned that this response to using his voice was habitual misuse of his whole psychophysical mechanism. He concluded that it was absolutely necessary for his perception of feeling right to be congruent with appropriate "good use" of his whole body. Since his observations indicated that he was actually pulling his head back and down when he felt that he was moving it forward and up, Alexander decided that his feelings were untrustworthy and that he needed to evaluate his procedures up to this point.(2) Certain concepts developed during and following this evaluation can be used to summarize the Alexander Technique.

When a performer desires to improve his or her activity, there is an attempt to identify and change inefficient movement patterns. One of the major obstacles in successful performance is what Alexander called "endgaining."(1) It involves a specific series of movements initiated according to a subconscious, preconceived idea of the process employed in achieving a performance objective. Because of this preconceived notion, the performer consciously directs his or herself toward this goal without being aware of the movement process employed in obtaining it. Therefore, the sensations of proprioceptive feedback, experienced during the movement process, never reach the conscious level. Identification of movement patterns at the subconscious level is virtually impossible and thus the performer's attempts to change inefficient movement patterns prove futile.

Failure to alter inefficient movement patterns is due to the preoccupation with achieving a desired activity. Though the performer seeks to change the aberrant movement patterns involved in the activity, his or her failure lies in focusing on the end product rather than the process to achieve it. Alexander developed a method of changing the performance objective while allowing for performance of the desired activity.

In the Alexander Technique, the performance objective is moving the head up and allowing the body to follow. A teacher of the technique verbally and kinesthetically helps the student achieve this objective. In attempting to maintain this objective while performing the originally desired activity, there is a moment when endgaining occurs. At this point, the teacher verbally reminds the student to keep the performance objective in mind. Simultaneously, the teacher gently manipulates the performer to move upward in order to accomplish this objective. This process brings proprioceptive feedback to a conscious level facilitating the performer's awareness of previously unfamiliar sensations associated with the new movement pattern. Consequently, cues of inefficient movement patterns become evident. Thus the performer can consciously avoid the tendency to move according to habitual, inefficient movement patterns thereby permitting occurrence of the new movement pattern through realignment.

The Alexander Technique can thus be seen as a method of bringing proprioception to a conscious level so that ineffectual movement patterns can be changed. How do the principles involved in this process relate to tension control? This question will be addressed as it concerns reduction in muscle tension, improved body alignment, subjective experiences of relaxation, and a possible psychological factor resulting in tension control.

Through his observations, Alexander discovered that he exhibited a large amount of unnecessary tension in his legs and feet during recitation.[2] The improvement of his "use" eliminated this excessive tension. There are numerous clinical observations of individuals who raise their shoulders or tighten their arms when walking or rigidly set any number of muscles not directly involved with the chosen activity. For the most part, bracing patterns are already present in these muscles and become more established as the subject approaches activity. With instruction in the Alexander Technique, these fixed patterns of muscle tension diminish over time. Rigidly fixed areas of the body become supple and with movement the entire body appears more integrated.

Using multiple-image photography, Jones and associates examined differences in movement between habitual and guided (moving with the aid of an Alexander teacher) movements.[5,8,9,11] Several linear and angular measurements of the head, neck and trunk differed significantly between the movements. Increases in two of these measurements were used to show that the rectus abdominus and the upper trapezius lengthened during the guided movement.[8] These measurements were associated with subjective reports of decreased effort during movement. Though muscle tension was not measured it is assumed that subjective reports of reduced effort also indicates reduced muscular tension.

In a subsequent study, muscle tension was measured directly.[10] Jones and associates studied postural images electromyographically. They asked subjects to go from the self-imposed postural image of most comfortable to best to greatest sitting height. Naturally, the postures were attained through habitual movement patterns. Sternomastoid muscle potential increased significantly as the subject gained sitting height. However, there was also a significant decrease in sternomastoid muscle activity when instruction in the Alexander Technique was applied to increasing sitting height. The investigators interpreted the decreased sternomastoid activity, brought about by the technique, as the elimination of a flexor response which inhibits extensor facilitation in obtaining the most upright posture. Extensor inhibition requires that additional muscle activity be employed to maintain this posture. When the Alexander Technique is applied, antigravity reflexes are initiated through the elimination of extensor inhibition. Subsequent investigations by Jones produced a similar theory.

Through x-ray techniques, Jones and Gilley [6] demonstrated that the Alexander Technique produced changes in several linear and angular measurements between the head and the neck. They interpreted these findings to mean that a realignment occurs between the head and the body due to a gravitational torque placed on the head through application of the technique. This torque transmits tonus to the extensor muscles at the back of the head and indirectly to the muscles along the spine, thus changing the controlling forces of posture. This change in postural forces increases tonus throughout the postural muscles so that the body is supported by an integrated system working with gravity. Thus, the subject no longer has to maintain unnecessary tension to support him or herself against gravity.

Subjective reports of the movement and the upright posture, produced by the technique, being easier than normal [5,7,9] were attributed to this change in postural forces. In one of these studies [7] the technique elicited additional subjective responses of an increased kinesthetic sense of lightness, decreased feelings of tension and fatigue, and in increased control of activity including changes in respiration. Brown[4] corroborated these findings and reported additional effects. The habitual movement was compared to guided movement, subjects indicated that the movement was easier, more relaxed, and steadier. They also felt taller and more alert and were able to breathe with less of a sense of constriction. Assuming the validity of subjective reports, the Alexander Technique is clearly an effective means of tension control.

To insure that these reports were not induced by suggestive verbal instructions, Brown studied suggestive and ambiguous expectancy sets combined with either kinesthetic guidance (in a 2 x 2 factorial design) resulting in realignment or with kinesthetic guidance and a postural set position. An analysis of the main effects of the expectancy manipulation showed that, for most of the dependent variables, the positive expectancy set was significant for both types of kinesthetic instruction. However, for the great majority (20 of 28) of the indices indicating overall postural treatment effects, the ambiguous expectancy condition was also implicated. Thus, the suggestion possibly given by verbal instructions in the Alexander Technique does not appear to influence subjective reports such as those mentioned above.

Another result of the Alexander Technique which Brown touched upon in his study is that of a sense of enhanced competence. By observing his or her manner of use and thus inhibiting habitual patterns, the subject realizes that he or she can choose to respond either according to the old movement patterns now recognized or according to the new movement pattern of realignment. A resulting psychological factor might be a sense of control derived from this realization of a freedom to choose a response. Subjects' reports of an increased control of activity[7] and students' reports to the authors of feeling in control hint at this sense of enhanced competence. The possible results of an increased sense of control could give the subject a sense of confidence in being able to face stressful situations in a manner, other than habitual, resulting in a reduction of tension due to anxiety.

The above studies have indicated that the Alexander Technique can be used as a means of controlling excessive tension. Since, as the above explanation indicated, the Alexander Technique is primarily involved in correcting inefficient movement, it is not seen as a method of deep relaxation , although it might be considered as an adjunct to methods which attempt to induce deep relaxation, since Brown's[4] and Jones'[7] studies indicate that it facilitates relaxed respiration. However, due to its movement orientation the main contribution which the technique can make to tension control is in the area of differential relaxation. In this respect, the authors see it as a very effective means of tension control and hope to see it clinically and experimentally evaluated.

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The Methods of Alexander and Jacobson

by

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Introduction

Alexander and Jacobson both have comprehensive systems for teaching muscle control. Since the striated muscle system is the organ of volition, they teach the basis for the control of all those aspects of behavior that are subject to volition. Mastering self-control is a tremendous undertaking and many factors are involved in teaching this skill.

This paper is in three parts. The first part discusses some of the aspects of teaching muscle control in which Jacobson and Alexander use similar approaches. The second part discusses the primary differences between the two methods and the third part discusses some aspects of posture using concepts drawn from both systems.

Similarities

1. Responsibility: Jacobson (1970, p. xiii) and Alexander (1923, p. 130) have both stressed that students must assume responsibility for behavior. Perhaps it is obvious that people will not assume self-control as long as they blame the external situation or other people for their problems and wait for some white knight to miraculously save them from the awesome dragon. The matter of getting students to assume responsibility for every response they emit is probably the most important part of training.

Few of us realize that pain, suffering, fear, anger, anxiety, perception, and certainly gross behaviors, are our own doing and that through muscle relaxation these responses can be controlled. We usually don't believe this until we can control these responses ourselves. Only as we assume responsibility and exercise self-control are skill and mastery of life attained.

2. Cure vs. Prevention: Both Jacobson (1970, p. xiv) and Alexander (1923, p. 56, 57) have stressed that the teacher promises nothing. The student must assume responsibility and learn a new way of behaving. Most people seeking training in self-use have specific symptoms and they want the teacher to do something to them to remove these symptoms. They want a cure. The concept of cure is a crucial one and provides a good method for distinguishing between relaxation procedures.

A procedure that offers a quick remedy for a specific symptom, such as EMG frontal feedback for tension headaches, is a curative procedure. The cure has the advantage of being easy and quick, but the disadvantage of leaving the person with the same inadequate habits for dealing with life that created trouble in the first place. Alexander (1923, p. 93) says that students generally ask, "Have you ever 'cured' a case like mine?" and he answers that he does not undertake to "cure" anything or anyone. Jacobson also avoids attacking a particular symptom.

Clearly the goal of a program designed to teach a person effective living habits is quite different from the goal of curing a symptom. The concept of cure is closely related to responsibility. In cure systems the patient places the responsibility on the therapist and in hygenic systems the student assumes responsibility.

3. Basic Life Change: Self-control is a 24-hour-a-day endeavor. Not only is it a full-time practice but it involves a radical reorientation towards the way we use and regard our bodies. For Jacobson we must learn to constantly monitor our muscle tensions and for Alexander we develop continual consciousness of our "use of self." A student in either of these systems learns an entirely new way of living that idealy effects every act in which the pupil engages (Jacobson, 1970, pp. 49, 54-56, Alexander, 1923, p. 306).

4. Education: These issues naturally lead to the consideration of education. Because of the hygenic nature of self-control the ideal is to teach children proper self use rather than wait until the adult has a severely damaged body and then commence training. Alexander conducted a school (Maisel, 1969, p. xx) in addition to writing extensively on education, and Jacobson has devoted extensive time and effort to education (Jacobson, 1973).

Alexander (1923, p. 94) emphasizes that adults in our own society seek cures rather than hygiene. Before we can educate children we must educate adults to the value of these hygienic measures. A major problem here is that people cannot assimilate new ideas without changing what they do (Alexander, 1923, p. 149), so the re-education must begin with adults and must consist of training in muscle control.

These first four items have all been concerned with the matter of responsibility. The students must be taught to assume responsibility for everything that happens and everything they do. They cannot shift this responsibility to the teacher as a healing messiah or to their enemies who as persons or things bring them disaster. Neither Jacobson nor Alexander imply that the teacher is not responsible for doing an excellent job.

This brings us to the second major pattern of behavior that must be instilled in the subject for maximum success.

5. The Error of Concentration: The ability to concentrate is highly regarded in our culture and all our lives we are told to pay attention or to concentrate on one thing. Jacobson (1929, pp. 35, 110, 111) emphasizes that attention requires muscle tension and that as relaxation advances

attention diminishes. The methods of Jacobson and Alexander require that the person be aware of sensations arising from the body as well as sensations arising from outside the body. This is a marked decrease in concentration, because sensations from the entire body are monitored, which is in itself a diffuse experience, and environmental stimuli are added to this.

People who think in terms of concentration will believe that this must be incredibly difficult because as hard as it is to concentrate on one thing it must be impossible to concentrate on dozens of things. When the muscles involved in perception are relaxed attention diffuses to include more sensations. If we relax enough, perception stops and we are left in the full field of sensation. Jacobson (1970, pp. 54-56) defines "easy" as that which requires no work, so by that definition diffusing attention is one of the easiest things one can do.

Diffuse attention is implicit in the techniques themselves but both authors explicitly discuss the problem of concentration. Jacobson (1967, p. 26) says that "Perception is always an effort under the (often distorting) influence of emotions..." He (Jacobson, 1970, p. 37) says that emotion is thinking with autonomic involvement, and the greater the emotion the less the reasoning. In emotional activity the organism becomes more sharply focused, and more narrowly directional. The purpose of training is to maximize efficiency, (Jacobson, 1970, p. 43, Alexander, 1923, p. 168) so as with other secondary behavior, emotional behavior must be kept to the minimum necessary for effective function.

Alexander makes a major point of the problem of concentration (1923, p. 260). To function effectively we must be aware of ourselves and our activity at the same time (Alexander, 1923, p. 268). Concentration is the ill-conceived cure for mindwandering (Alexander 1923, p. 28). This is tensing to overcome a tension problem (Alexander, 1923, pp. 261, 262). Alexander (1923, pp. 272, 275) believes that concentration leads to loss of memory which impairs rational thought.

Many human functions require some concentration, but focusing attention on one thing is literally crippling to normal function and for most purposes the optimum amount of concentration is the minimum to maintain perception.

6. Goal Orientation vs. Means: People strive to survive and succeed in their various undertakings. Jacobson (1970, p. ii) calls this the "welfare response." The welfare response is complex, requiring muscle tension

in perception, evaluation, reflection, and neuromuscular action (Jacobson, 1967, p. 20). The welfare response is important because it captures our attention, leading to tremendous levels of tension.

Jacobson (1970, p. 366) says that "anxiety is characterized by effort to solve problems, by effort to meet situations." Severe anxiety arises when the person believes efforts are failing. Anxious reflection is "goal living" and is a doing of the student that can be relaxed out (Jacobson, 1970, p. 54-56). For effective treatment the subject must be taught to distinguish between the difficulty and his response (Jacobson, 1970, p. 373). Then ineffectual problem-solving efforts that seem so natural must be sacrificed, and anything important to better the objective situation must be optimized (Jacobson, 1970, p. 375).

The above quotes and paraphrases from Jacobson show the important role that he gives to the erroneous behavior of focusing attention on goals rather than including behavior in our awareness. This issue is at the very heart of Alexander's system. He uses the terms "end-gaining" vs. "means-whereby." "End-gaining" involves a direct procedure on the part of the person endeavoring to gain the desired "end" and our ill-considered end-gaining accounts for the undue stress and strain of life undermining our reserve forces, leading to organic derangement and kinesthetic perversion. "Means-whereby" involves a reasoning consideration of the causes of the conditions present, and an indirect rather than a direct procedure to gain the end (Alexander, 1923, pp. 10, 11).

The idea in both systems is that for optimum performance we must be aware of what we are doing as well as the goal we wish to attain. Awareness of doing means maintaining proprioceptive feedback indicative of relaxed performance.

7. Living in the Present: Both of these systems deal with monitoring proprioceptive feedback to optimize behavior. This means two things.

The first is that regardless of the cause of our inadequate behavior the only way to change that behavior is to deal with the way we behave right now (Jacobson, 1970, pp. xvii, 367; Alexander, 1923, p. 91).

The second thing is that we must abandon the energy-wasting behaviors we use to escape the present. Alexander (1923, pp. 18, 24) calls this "mind-wandering" and describes it as the shortcoming which interferes most with immediate activities. He defines mind-wandering as the inability to attend to the task at hand.

Jacobson (1970, pp. 54-56) calls this "anxious reflection". It is tensions of visualizing, talking or acting. It is goal-oriented behavior and should be relaxed out by observing our controls and making control a habit. The tensions of the vision and speech regions trigger reactions of

the total organism more than any other system of voluntary muscles (Jacobson, 1970, p. 41), so gaining control of these areas is a must for effective tension control.

8. Scientific Validation: This brings us to the last area of agreement which is concerned with verifying objective changes in observable behavior rather than depending on subjective reports of cures which all systems produce that have any success. Jacobson (1970, p. 16) depended upon EMG for his scientific validation and looked at covert responses. Alexander himself used changes in overt behavior that could be directly subjected to social consensus as objective criteria. Alexander's students (Jones, 1976, p. 106) have used EMG, force measurements, and photography to document covert and overt evidence of reduced tension as a result of applying the Alexander principle.

9. Mind Equals Body: Both systems assume that the activities of perception, thinking, imaging, etc., that one normally considered functions of the mind are things that the body does. These so called mental functions are controlled by learning to use the body efficiently. The distinction between mind and body is particularly destructive because it distracts us from the only possibility of really gaining self-control.

10. Relaxation: Both systems are involved with muscular relaxation and energy conservation. This is obvious in Jacobson's work since he put so much stress on measuring muscle tension and states that the aim of all medical practice is to increase human efficiency (1970, p. xv). Since Alexander rarely used the word relaxation and does not direct attention to muscle tension, his system is not usually characterized as relaxation training. Alexander's writing is much easier to understand if the word inhibition is correctly interpreted as physiological relaxation.

Alexander states (1923, p. 168, first published in 1910) that what is being learned is "a reliable sense appreciation of the minimum of so-called 'physical tension'." We develop "a correct register of the due and proper amount of so-called 'muscular tension' necessary at a given time." He also refers to our poor self-use undermining our reserve forces leading to organic derangement (Alexander, 1923, pp. 11, 12). It is apparent that Alexander considered himself to be teaching physiological relaxation. Jones (1976, p. 149) states that "the significance of inhibition in the intact organism" was Alexander's major discovery. Jones did not equate inhibition with relaxation but he does carefully explain that inhibition prevents inappropriate activity resulting from excessive shortening of muscles (Jones, 1976, p. 149).

Differences

As we have seen looking at the two systems from a distance, they are remarkably similar. In order to discern the differences, it is necessary to move in and take a closer look. This is not necessarily easy in the case of Alexander's system because in the actual teaching he relied on demonstration rather than verbal explanation. The approach used here is to postulate what Alexander is doing and then compare that with what Jacobson does.

1. Joint Feedback vs. Muscle Feedback: The basis of the Alexander principle is to achieve "the greatest lengthening of the spine possible in whatever we may be doing." (Maisel, 1969, p. xxiii). This lengthening of the spine is described in three instructions: (1) Let the neck be free (do not increase neck muscle tension in any act). (2) Let the head go forward and up (relax neck muscles). (3) Let the torso lengthen and widen out (Maisel, 1969, p. xxiv).

Jones (1976, p. 141) describes one of the mechanisms for the change in spinal length as being increased separation of the vertebra due to hydraulic pressure exerted by the interverterbral disks. The vertebra are allowed to separate because the muscles lengthen reducing the pressure on the disks. Jones (1976, pp. 141, 142) suggests that the changes in the disks and other weight-bearing joints may explain some of the sensations involved in the Alexander technique.

This can be summarized by saying that the primary sensations involved in the Alexander technique are lengthening and widening and that these sensations arise from sensory receptors associated with the joints.

The same sensation is used in one of the martial arts (Tohei, 1961, pp. 44, 45) which works by controlling the opponent's reflexes rather than by overpowering the opponent. Basic to learning proper technique in that system is cultivating the feeling of energy flowing out from the center of mass of the body. They use the analogy of the arm being a fire hose with water flowing out or of letting the arm extend out into space. Westbrook and Ratti (1970, p. 79) call this the "principle of extension."

The explanation of Alexander's procedure proposed here is that kinesthetic sensations, including joint and tendon with muscle, can be used to achieve relaxation in two ways. The first way is to allow the joint to separate so that the body part involved lengthens. This can be illustrated using Jacobson's training procedure of tensing the arm without moving it. This tensing can be achieved by instructing the student to shorten the arm without it bending. The relaxing can be achieved by "letting" the arm lengthen. These instructions direct the subject to attend to joint and possibly tendon sensations to achieve relaxation.

The second way of using the joint sensations is to "let" the body part move in the direction opposite to the movement created by tensing the muscle. It is not necessary that the part move. All that is necessary is that the part be permitted to move if it will. The word "let" is crucial because if the person is instructed to move the part, the antagonistic muscles will be tensed. This is the form of instruction used by Alexander when he says "let the head go forward and up" (Maisel, 1969, p. xxiv). Several other factors such as centralization, leading control and, sphericity (Westbrook and Ratti, 1970, pp. 69-96) are involved in Alexander's method that are beyond the scope of the present discussion.

With this explanation of the sensory aspects of Alexander's method the primary difference between the methods of Alexander and Jacobson become clear. Alexander's method relies primarily on sensory feedback from the joints and possibly the tendons, and Jacobson's method depends primarily upon sensory feedback from the muscles.

This leads immediately to a second major difference.

2. Sensory vs. Motor Training: In developing the ability to engage in basic movements such as walking, reaching, etc., we have already learned to use information arising from the joints to perceive where the body is in space and how it is moving. Muscle sensations are vague in the untrained subject compared to joint and tendon sensations (Jacobson, 1929, p. 44). For this reason Jacobson's training is primarily directed at learning to attend to muscle sensations. Very little instruction is given in how to relax the muscles.

Jacobson (1973, p. 84) uses the joint feedback method number two above but he does not call attention to the movement as a useful clue. The left hand is bent back and the student notices the tension in the upper part of the forearm. The instruction then is to discontinue effort. All that is needed is to go negative. The subject does not put the hand down because as indicated above that causes tension in the antagonistic muscles. Even though Jacobson uses this motor technique he directs the student's attention to the sensory feedback from the muscles and does not explain that the joint movement even could have value. The joint sensations interfere with attending to muscle sensations and are therefore a problem to be overcome rather than as asset to use. (Jacobson, 1970, p. 45). For this reason Jacobson's training can be characterized as primarily sensory training.

Alexander's method uses the perceptions of body position which are already well developed but distorted. Physical manipulations are used to immediately attain corrected sensations so that the emphasis in training is on how to relax the muscles. The instructions to cause changes in joint pressure or position are actually the same type of motor instructions which people normally use. Muscles are normally controlled to cause movement toward some goal so an instruction to move or let move is a motor instruction. For this reason Alexander's method can be characterized as primarily motor training.

3. Covert Responses vs. Overt Responses: A student receiving instruction from Jacobson would spend most of the class and most of the specific relaxation time either lying or sitting still. The training is involved with covert processes and the emphasis is on using EMG to observe the student's progress. Alexander's student would be learning the technique while in motion such as changing from a sitting to standing position, walking, or talking. The teacher detects errors through gross effects that are detected with the unaided senses.

A direct comparison can be made in the approach to speech since both teachers are concerned with vocal processes. In Jacobson's system there is some overt speech but most speech work is internal or covert speech. The teacher monitors the student's success with EMG electrodes over muscles of the tongue, lips, eyes, and other body parts. In Alexander's system the student talks out loud and the teacher visually and auditorially monitors posture, breathing, movement, and uses of the vocal apparatus.

4. Modification of Goals: Jacobson's teaching method focuses attention on learning to observe muscle tension and relaxing secondary tensions that distract from a goal. He requires students to maintain the "status quo" as much as possible and gives the example of requiring a heavy smoker to continue smoking (Jacobson, 1964, p. 15). He does this as a scientific control to be sure that beneficial changes are the result of the training itself as distinguished from specific changes in overt behavior.

Alexander takes the opposite view and makes the elimination of useless and tension causing goals part of the training. As children many people are taught to hold the shoulders up and back and this becomes a more or less subconscious goal that directs their behavior. If they are to relax the primary tensions involved in this goal they must change the goal. Alexander teachers (Barlow, 1977, pp. 41-43) acquaint the students with more appropriate goals and show them how to elicit the altered sense perceptions accompanying the new goal. This is in addition to the general instructions.

This difference follows from the primary goal to be achieved in each training program. The goal of Jacobson's training is to monitor muscle tension and perform each act with the minimum muscle tension. There is nothing in this instruction which specifies the nature of the act itself. The goal of Alexander's training is to perform each act with maximum extension, particularly of the spine. This instruction does effect the nature of the act because any subgoal which prevents extension must be eliminated.

An Application of the Two Principles To The Standing Posture

When the practical principles of physiological function are ignored, the confusion that arises about the most common of human functions is truly astounding. The normal standing posture is typical of a common function that is

almost universally misunderstood. The points of "good" posture presented by Tucker (1969, pp. 25-29, 78, 79) are typical of those described to the author by physical education teachers in two universities and by Anthony and Kolthoff (1971, p. 138) and will be presented here. These points will then be discussed from the perspective of relaxation and the use of sensations by students of Alexander and Jacobson will be described.

Here is how Tucker (1969, p. 78-79) says to acquire an Active Alerted Posture which he expects to be maintained in daily life.

"1. Pull up the arch muscles of the foot so that the weight is carried evenly on the heel and the outer border; the forefoot gripping the floor with the toes, knees slightly bent.

"2. Tilt the pelvis so that the stomach muscles are held up and contracted, with the buttocks tucked under and the buttock muscles firmly contracted...

"3. The shoulders should be slightly up, the chin tucked in, and the head balanced on the shoulders so that there is no tendency for the head to fall forwards. The effect of this is to make the back of the neck as long as possible and fix the shoulder girdle firmly to the chest wall."

He says (Tucker, 1969, p. 10) that this is a form of continuous isometric exercise with the muscles on one side of the body continually working against those on the opposite side. The proper pelvic inclination is 30 degrees. The following muscles are specifically mentioned as tensed: (1) anterior and posterior tibial muscles, (2) long and short flexors of the toes, (3) intrinsic muscles, (4) quadricepts, (5) hamstrings, (6) abductors and adductors of the thigh, (7) flexors, extensors, abductors and adductors of the hip ("The glutei should contract so hard that a coin can be held between the natal cleft"). (8) abdominal muscles, (9) erectores spinae, (10) trapezii, (11) levators anguli scapulae, (12) scalenes, (13) rhomboids, (14) serrati.

Now let's consider the initial description from a relaxation point of view. Normally one would start at the head but we will follow Tucker's lead and start with the feet. These descriptions are not to be considered as instructions. Properly executing any of these as instructions would leave most students sprawled on the floor if other postural adjustments were not made.

1. Alexander (1918, p. 274) would have you stand with the feet at at least a 45-degree angle to each other and about 18 inches apart (Barlow, 1973, p. 37). With the knees slightly bent, let the knee caps turn outward if needed, (Barlow, 1973, p. 39).

Jacobson's student, maintaining the foot position with the knees slightly bent, relaxes all of the muscles of the thigh. Any muscle tension required in the gluteal group of the buttocks to keep the leg extended will abduct the thigh, bringing the feet and knees into the proper position. The gluteal group

connects to the posterior pelvis so that as it tenses to extend the legs they rotate the pelvis forward. This phenomena is particularly effective when one foot is lifted as in stepping because the pull of the abductors in stablizing the pelvis increases to about 312 lbs. for a 200-pound man (Williams and Lissner, 1967, p. 110).

2. Alexander would have you lengthen the spine. The writer finds it helpful to lengthen the lower spine, and the joint where the femur joins the pelivs permitting the legs to lengthen. Then the angle between the front of the thighs and the front of the pelvis is allowed to increase as if stepping backward. This permits the pelvis to rotate forward to an angle somewhat less than 30 degrees, giving what Tucker (1969, p. 11) would call a flat back. The lower spine is straighter than in the average posture (Barlow 1977, p. 63). Lengthening and widening the back also corrects kyphosis (tendency to hunch back). Tension in the illiopsoas pulls the lumbar spine and the iliac crest of the pelvis toward the femur causing lordosis. The rectus abdominis external and internal obliques and probably the transversalis pull the sternum toward the pubic bone causing kyphosis. The writer finds it helpful in relaxing these muscles to permit the sternum to rise, spearating from the pubic bone.

Jacobson's students would relax these muscles by releasing tension in the abdominal region and also muscles in the front of the thigh. This will let the pelvis rotate forward and the spine straighten allowing the muscles of buttocks, rear thigh and back to attain maximum possible relaxation. If kyphosis is evident the back muscles have to pull against gravity and the front abdominal muscles. That is why the back is most relaxed with the spine in a proper upright position.

3. Alexander would have the student let the shoulder blades come forward and down so that they rest on the rib cage (Barlow, 1977, p. 42). The head is permitted to pivot forward where the skull sits on the cervical vertebra until it moves as far as is comfortable (Barlow, 1977, pp. 16-27). Now let the back of the head float up permitting the neck to lengthen.

Jacobson's students would relax the muscles holding the shoulders rigid, particularly the trapezius and other back muscles. They then release the tension in the upper trapezus and other muscles in the back of the neck with the sternocleidomastoid and other muscles in the front of the neck.

They have now relaxed into a posture which even surpasses the active alerted posture in giving a straight competent appearance. The relaxed posture is identical with the basic posture in Akido (Westbrook and Ratti, 1970, pp. 145-147). This form of use is employed because it gives the maximum possible flexibility and freedom of movement.

The choice of posture as an example does not imply that Alexander's system is primarily concerned with posture (Jones, 1976, pp. 155, 160).

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Awareness

How We Get There

by

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77

The word "awareness" itself, like the words tension and relaxation and others used in our field of tension control, is one that may be defined differently by each of us.

To try to avoid some of the semantic confusion I will define tension as shortened muscle fiber--neuromuscular tension as one electrically turned on. I will define the word relaxation, or more specifically, scientific relaxation, as lengthened muscle fiber. Neuromuscular relaxation is one electrically turned off or approaching zero microvolts.

Now in trying to define awareness I mean conscious perception--the receiving of an impression through the senses and the ability to perceive differences. Most of us depend on seeing, hearing, tasting, touching and smelling. Those trained in progressive relaxation or self-operations control or other modified versions learn muscle tension sense and an ability to differentiate the strength of the muscle signal.

Individually our degree of awareness may fluctuate greatly or be incompletely perceived. Some people will use dance as Gerta Alexander did in Europe or perhaps as Gary Schwartz mentioned in his paper presented earlier today. Some will teach awareness through movement as does Moshe Feldenkrais. Some will teach others to become aware of parts of which they are not conscious with the help of those of which they are conscious. Some people will use hypnosis or the Alexander Technique (F. M. Alexander, the Australian dramatist).

We learn early to ignore or tune out muscle signals. Through practice on relaxation we spend time tuning in to these very signals, or should we say, the absence of the muscle signal when we are relaxed.

It is a very lengthy process to go through progressive relaxation and learn to identify signals in all muscle groups. And that is not enough. We need to learn differential relaxation and incorporate these techniques into our daily life style so we operate with less fatigue and with a decrease in wasted energy. We would all like to learn short cuts. Let us now try to be aware of any wasted muscle energy as we sit in this room. Correct your posture as you sit--feet flat, everything out of your hands, head balanced over the spine and relaxing muscles not needed for holding postures and paying attention. This is differential relaxation.

Have you been aware of your head postures as we have spent this day listening? Some of us with bifocals change our head posture to view slides and continue holding this energy-wasting posture much longer than needed for viewing the slides.

What are you doing this moment with your jaw? Let us try an exercise to check the jaw--open and insert one finger sideways--now try two fingers and now three fingers--anyone for four? Now relax. Wait a moment. Become aware of jaw muscles relaxing, not closing tightly.

From time immemorial man has developed systems to increase his awareness of self. Within each of the world's major religions there is mention of mind control or meditation or self awareness and some have elaborate systems of self discipline. I read an article recently on inner skiing. Before that it was inner tennis and golf. We open our mail regularly to announcements of conferences on centering, balancing, shaping and so on and on.

My background and experience is in physical therapy. We physical therapists work with patients on doctors' referrals. We evaluate and treat as the need arises, and as re-evaluation shows the need for change we make it. Many patients have come to us for postural correction in trying to cope with functional neck and backache. As we teach them to stand correctly and to "screw their head on straight," many times guiding body parts with our hands, we find other functional problems are corrected.

One patient took many weeks of retraining to get rid of his backache--many hours of deep tissue massage to relieve spasm--but gained a great side benefit. His long-standing bowel problem left at the same time. I noted in my lecture before this group in 1974 that in muscle re-education of some polio patients they also got rid of functional bowel and tension headache problems. In muscle re-education we instruct patients in origin and insertion and action of specific muscles. We touch the muscle and palpate as patient contracts and relaxes, and instruct him to keep holding or to relax better. In a sense, we physical therapists act as the patients' external biofeedback. The more we verbally communicate to them the better they perceive and develop an awareness of the muscle signal--a form of relaxation training as well as strengthening muscle, a teaching of awareness.

Our chronic back and neck patients often times show nothing in X-ray. The biofeedback machine readings are low and the technician sends them back to the physician who then states they just do not want to get better. Sometimes the physician again refers them to physical therapy for re-evaluation.

This is the patient on whom I like to get a complete history, especially looking for other functional problems. This is also the patient I want to carefully examine for minor postural deviations, for hard muscles along entire spine, those tender to touch. I need to carefully examine skin and connective tissue. Skin is usually adherred and tender. This patient needs skin rolling and lots of connective and soft tissue manipulation--perhaps other physical measures to reduce muscle spasm.

Often times these patients are shunted about from doctor to doctor and get labels such as hysterical and psychosomatic. It may be true they have emotional problems, but this involves muscle and muscle fatigues. In a study by Dixon, O'Hara & Peterson on "Skeletal Muscle Contracture" this is described as fatigue spasm--a chemical state in which muscle restricts its own blood supply and hence not enough oxygen is supplied to reverse the creatine phosphate level and restore the adenosine triphosphate.

This is what we do in massage or tissue manipulation--literally squeeze the blood into the muscle. We sometimes use electrical currents to contract and relax muscles and hence improve oxygen exchange. These very patients when checked again on the biofeedback machine show increased microvoltage output.

Through making them aware that it is they who operate their muscles and are responsible for their habits, through training in relaxation we are able to free them of chronic pain problems.

On further checks with biofeedback equipment they again show low readings. It has been my experience in the clinic that it is not the patient who is at fault but us--the physical therapists, doctors, psychologists, and others who have seen them. There needs to be a system of intelligent referral, for the best benefit of the patient. If I can make you all aware (informed) of the place of the physical therapist in medical practice and you can each make me aware of your specific use of relaxation training then maybe we can begin to work on this referral system.

In the Old Testament we read of the life being in the blood, but no one really understood this until Harvey discovered circulation. Many today still do not learn much about circulation.

As in times past, we read of rest and learning to be quiet in our Bibles. No one really understood what this meant until the scientific research of Dr. Edmund Jacobson had given us the definitions for tension and relaxation with which I started this lecture.

Not too many in our world are correctly informed. I see this as one of the obligations of this association--encouraging all who are trying to make people aware of inner signals to be very scientific, to document as much as possible. All of us are under many stresses today, but whether they are due to extremes of temperature, infections, emotions, or other things, there is a muscle component. Through learning of electrical circuits and the feedback mechanisms within our human organism and how this all affects our functioning, we have a great challenge before us. How do we get there?

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Anxiety and Cultivated Relaxation: Reflections on Clinical Experiences and Psychophysiological Research

by

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In this paper I shall deal with the following three interrelated issues that have been the focus of my research and clinical interest during the past fourteen years:

(1) What is Progressive Relaxation? There are now a number of different techniques that all are referred to as Progressive Relaxation or "Jacobsonian" relaxation, but that differ from Jacobson's (1938, 1964) procedures in a number of important respects. In fact, do these methods all have the same effects?

(2) What kinds of people are used in studies of the effectiveness of relaxation? Do the results differ depending on the population?

(3) Do some of the various symptoms of anxiety respond differentially to particular relaxation techniques (cf. Davidson & Schwartz) or do they all respond approximately equally to all techniques (cf. Benson, 1975)?

Types of Progressive Relaxation Training and Choice of Subject Population

In retrospect, I can say now that the methods of relaxation training I had used as a graduate student were not particularly powerful. I had been reading Wolpe's (1958) work on the application of Progressive Relaxation to the treatment of phobias, and had begun practicing these techniques. During this time I had some success in treating several phobic patients, using a somewhat abbreviated form of Progressive Relaxation, combined with semi-hypnotic suggestion, imaginal desensitization, and some behavioral assignments for using relaxation in times of particular anxiety.

In this training people were given very brief relaxation training during which they were taught to tense their muscles as tightly as possible, and then to release them--with little or no training in recognizing very small amounts of muscle tension--of the sort that would register only a few microvolts on an electromyograph. This was--and, in fact, still is--the method of Progressive Relaxation used and taught by the majority of behavior therapists. In addition, much of the training was done via tape recording.

The major study I did at that time was a psychophysiological laboratory analog study of Wolpe's technique of Systematic Desensitization (Lehrer, 1972). My aim was to test Wolpe's hypothesis of "reciprocal inhibition": i.e., the hypothesis that Progressive Relaxation inhibits the physiological component of the anxiety response and thereby facilitates the extinction of that response. I tested forty subjects, ten in each of four conditions: Progressive Relaxation, muscle tension, a condition in which subjects were told to be aware of their level of muscle tension but to try not to change it, and a control condition in which subjects received no instructions at all. There were three testing sessions, during which subjects heard tape recorded instructions, and during which I measured palmar skin potential, heart rate, and respiration rate. After the first five minutes of the session, I began to give subjects mild electric shocks. Shocks began at approximately sensory threshold, and increased in intensity when the shock no longer elicited a measureable electrodermal response. I then increased the intensity of shock by a small amount, and

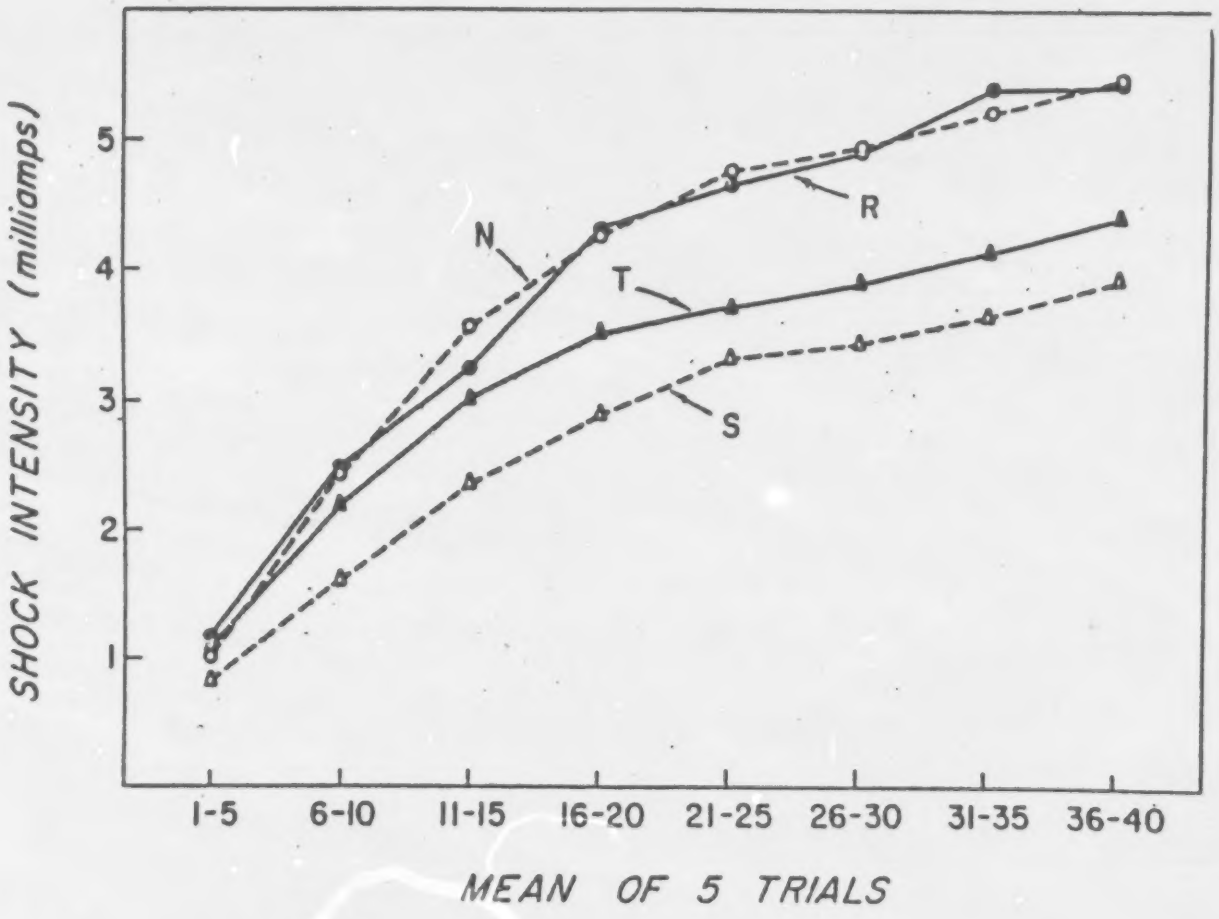

Figure 1. Habituation to Shock Overtrials. N = No Instructions, T = Tension, S = Hold Muscles the Same, R = Relaxation.
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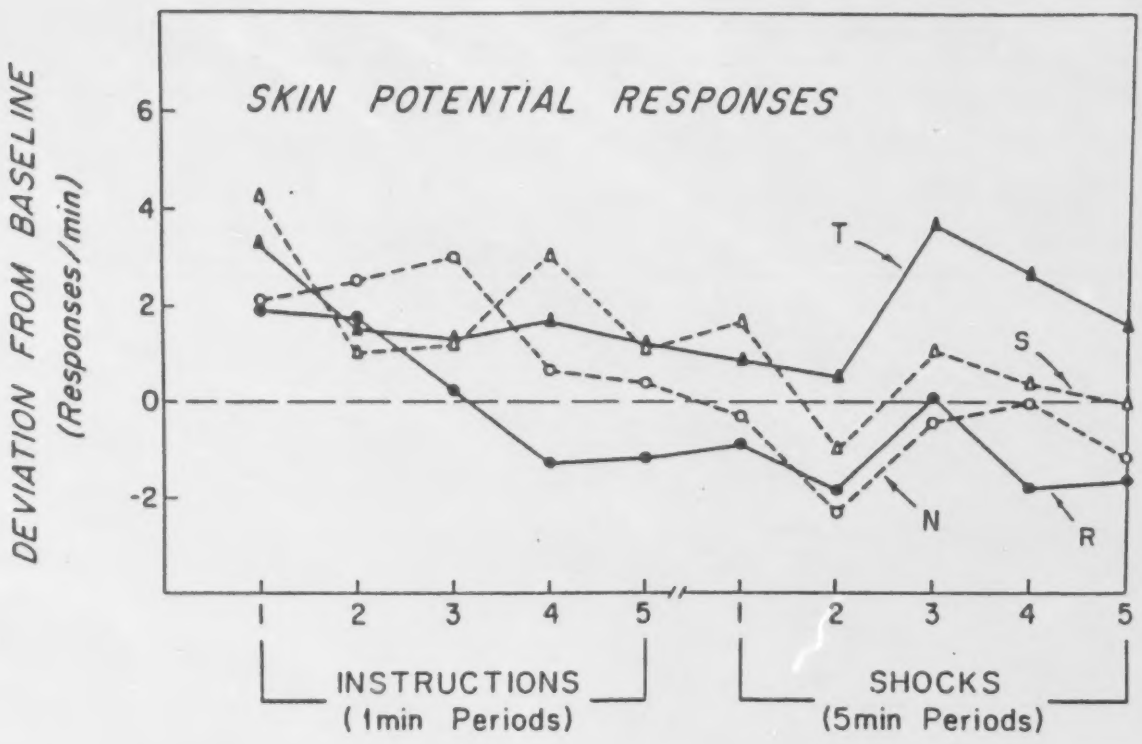

Figure 2. Frequency of spontaneous skin potential responses in Lehrer (1972) study.

continued at that level until the subject habituated to it, and then I increased the shock again. I thus studied habituation to shock as an analog of extinction of phobic anxiety. I found no differences between the "relaxation" group and the "no instructions" group in rate of habituation to shock (Fig. 1). Both of these groups did habituate more quickly than the "tension" group and the group that had been asked to hold their level of muscle tension constant. The Groups x Trials interaction was significant at $p<.01$. The relationships between groups was the same for frequency of spontaneous skin potential response, which was sampled throughout the session (Fig. 2). The Groups effect here was significant at $p<.001$. The "relaxation" group emitted significantly fewer skin potential responses than the "tension" and "hold-muscles-the-same" groups, but the difference between the "relaxation" and "no-instructions" group was not significant) $p<.2$). There were no significant differences between groups for tonic (d.c.) skin potential or for respiration rate. Although heart rate (Fig. 3) seemed to be lower in the "relaxation" group than in any of the other groups, only during one time sample toward the end of the shock period was the difference statistically significant ($p<.001$) between the heart rate of the "no-instructions" group and that of the "relaxation" group. The "increased tension" group's heart rate was significantly higher than that of all the other groups ($p<.001$) throughout the sessions.

To sum up: this study hinted that Progressive Relaxation has some autonomic effects, but the results were far from clear, because there were few significant differences between the "Progressive Relaxation" group and the "no-instructions" group. When told to sit in a comfortable chair and to close their eyes and to relax, my sample of relatively nonanxious subjects tended to get quite deeply relaxed, even with no relaxation instructions, and even though they were getting shocked. Indeed some subjects in the "no-instructions" group reported that they had had difficulty staying awake. The clearest results of the study were: (1) that normal subjects find it easy to relax quite deeply when they are seated in a comfortable chair and asked to close their eyes and relax, with or without relaxation instructions; and (2) that muscle tension increases physiological arousal and slows habituation to shock.

During the next several years other studies of relaxation appeared with rather inconsistent results. Some tended to show that relaxation has a physiological effect (Paul, 1969; Wilson & Wilson, 1970; Staples, Coursey & Smith, Note 1) and some that relaxation has no measureable physiological effect (Paul & Trimble, 1970; Grossberg, Note 2; Edelman, 1970; Haynes, Moseley & McGowan, 1975). A closer look at them, however, suggested that the less successful studies tended to use very brief instructions, tape recorded instructions, and subjects who were not particularly anxious--as in my experiment. In successful studies, at least one of these elements was different (Lehrer, 1978).

At the same time, I began to feel some dissatisfaction with the technique of Progressive Relaxation, as I was using it clinically. Although I found that I was rather successful treating phobic patients, I was not having particular success with anxiety neurotics or with some individuals whose tension symptoms were of the physiological sort, and also the technique did not reliably work for me. At that time I learned that Dr. Jacobson was still coming to New York to see patients, and I saw him regularly for about a year. During this time I saw the power of Progressive Relaxation as a method of

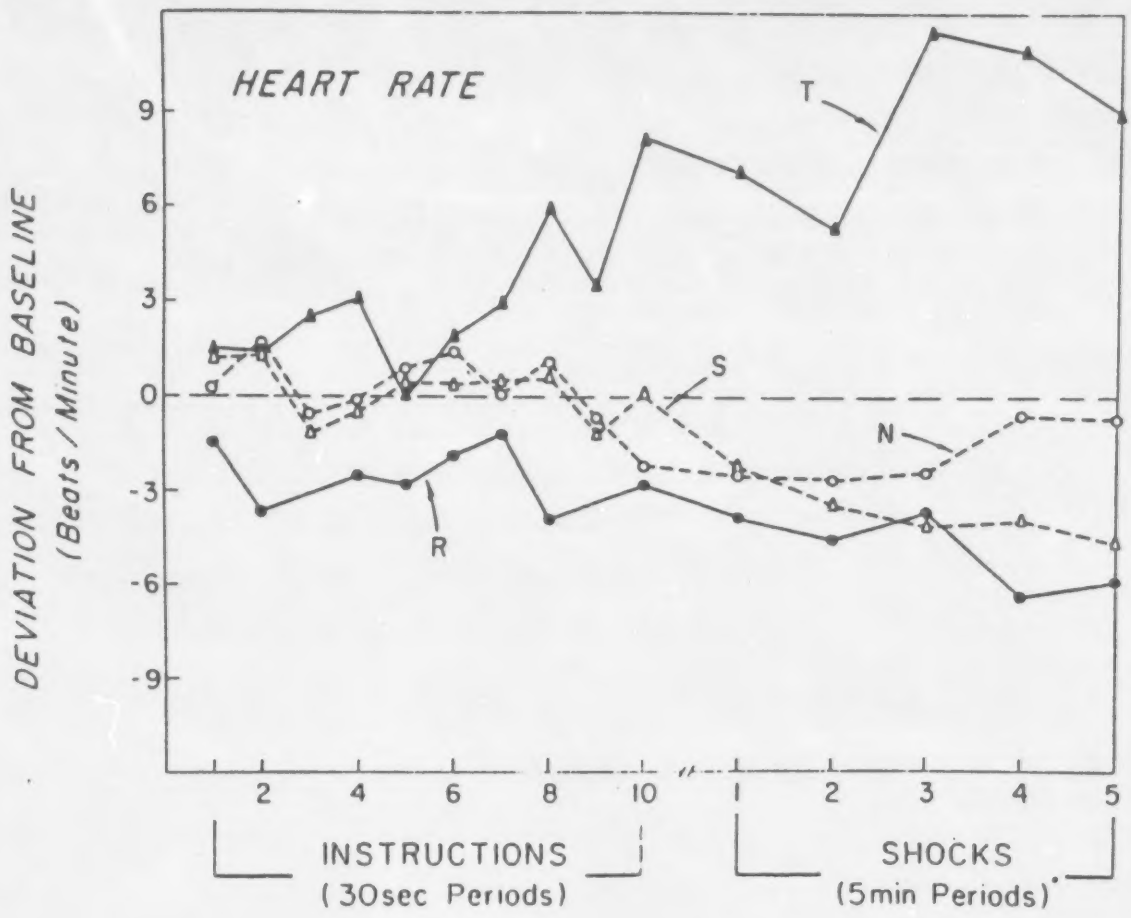

Figure 3. Heart rate in Lehrer (1972) study.

teaching very finetuned physiological control. I felt better myself and I was also having more success with my patients. The reasons, of course, could be many: e.g., working with Dr. Jacobson may have made me take the whole thing more seriously, made me practice more, and emphasize the technique more with my patients. However, I myself was convinced that his method of "slowing me down" and examining only a few muscle groups at each session, and searching for the smallest possible "control sensations" (cf. Jacobson, 1964) was the effective element in his training--what had been missing in my previous training, practicing, and teaching of the technique.

In 1973 I again had a psychophysiology laboratory at my disposal, and I again began doing research on Progressive Relaxation. In a study that was just recently published (Lehrer, 1978) I gave four once-weekly sessions of live, individual Progressive Relaxation training to each of ten anxiety neurotic patients and to ten nonpatients. I tested all subjects twice in the laboratory: once before training, and once several days after the last training session. In each training session subjects were given training in only a few areas of the body. I emphasized the importance of subjects' tensing as little as possible when they practiced, so that they could become aware of very low levels of muscle tension. Several days before the first training session and several days after the last session, subjects were tested in the Psychophysiology Laboratory. Control groups of 10 anxiety neurotic patients and 10 nonpatients were tested twice in the laboratory at approximately five week intervals, but were not trained in Progressive Relaxation. In the laboratory I measured skin conductance, heart rate, and occipital alpha. Each testing session consisted of an initial five minutes of relaxation, followed by five 1-second blasts of 100 db 1000 hz tone, as a startle stimulus, followed by five reaction time trials in which subjects were asked to press a button as quickly as possible after a variable interval "get ready" stimulus was turned off. The stimuli were used so that I could measure the effects of relaxation on physiological reactivity as well as tonic activity.

In general, I found that in the patient group Progressive Relaxation caused significant decreases in physiological arousal, while the nonpatients, as in my previous study, tended to look more relaxed over time with or without relaxation instructions. Figure 4 shows changes in various measures from the first testing session (pre-test) to the second. Progressive Relaxation significantly ($p<.05$) reduced skin conductance levels--but only among the patients. Cardiac accelerations elicited by the tones tended to increase or "sensitize" from the pre-test session to the post-test, but this tendency was attenuated among the patients by Progressive Relaxation training. The difference between the relaxation and control groups was significant at $p<.05$ among the patients. Among nonpatients, this "sensitization" of the cardiac defensive reflex was quite minimal in all groups, and the groups did not differ significantly. Progressive Relaxation also produced increases in per cent alpha--again only among the patients. These increases (compared to the control group) were significant ($p<.05$) for the epochs immediately after each of the five loud tones and before each of the reaction time trials. Although between groups effects were not significant for the nonpatients, there was some tendency among the nonpatients for alpha to decrease somewhat in the Progressive Relaxation group relative to the other groups. I will talk about this apparently paradoxical effect later.

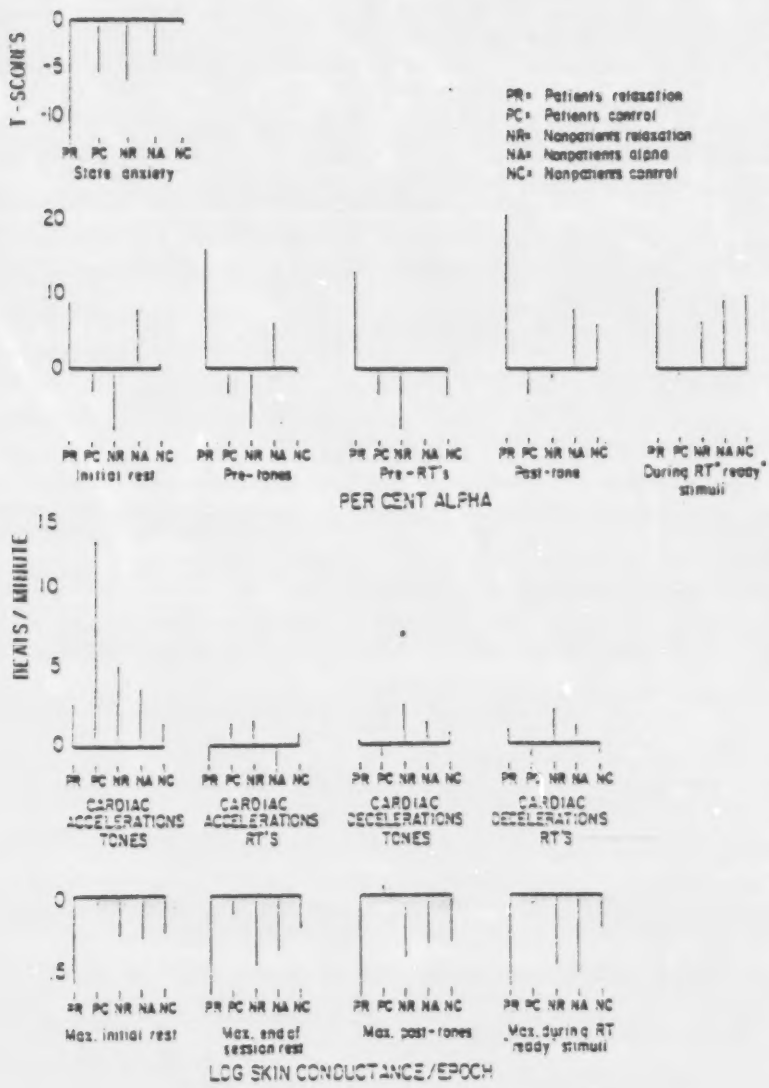

Figure 4. Differences between the pre-test and the post-test, adjusted for the level for each score during the pre-test session. From Lehrer (1978).

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A measure on which relaxation training significantly affected the non-patients but not the patients was responses to the state anxiety scale of Spielberger's State-Trait Anxiety Inventory. Although relaxation apparently produced greater reductions in the mean score among patients than among nonpatients, the variance among the patients was very high, indicating that some patients said they experienced large decreases in anxiety and others very little. The relaxation effects were not significant among the patients. Also, I felt that some of the patients were not willing to admit that they had improved, primarily because of "secondary gain": e.g., many of them came to the sessions with their spouses, and justified their dependency with their anxiety sumptoms. An improvement in anxiety would, for some of them, produce significant changes in their lifestyles--changes that many of them might have been conflicted about making.

Thus, in summary, this study found that among the anxious patients, live 4-session training in Progressive Relaxation reduced levels of physiological arousal. Among "normal" subjects this result was not as apparent, although Progressive Relaxation apparently reduced subjective symptoms of anxiety more consistently in this group than among the patients.

Physiological, Cognitive and Behavioral Dimensions of Anxiety

There is a growing empirical literature demonstrating that physiological, cognitive, and behavioral measures of anxiety are not well correlated with each other (Lang, 1968; Rachman & Hodgson, 1974; Hodgson & Rachman, 1974). Woolfolk and I recently have been doing some research into people's self perception of anxiety, and have found that, in fact, people tend to separate these three dimensions of anxiety in their own self descriptions (Note 3). We factor analyzed a 112-item symptom questionnaire, and found orthogonal factors for physiological, cognitive, and behavioral dimensions. Similar findings have been made by Fenz & Epstein (1965), Hamilton (1959), and Buss (1962).

I also can provide a few dramatic clinical examples of the distinction between cognitive, physiological, and behavioral symptoms.

I once worked with a severely obsessive compulsive lady who was a compulsive housekeeper, and who worried about orderliness in her home to the point where she was literally no longer able to enjoy doing anything else other than clean her house, which, in fact, she did not enjoy much. She also expressed a strong need to feel that she was "in control" of herself and her life. At one point in treatment I tried to teach her Progressive Relaxation, under the assumption that a reduction in anxiety might free her from some of her worrying about housework. I did not succeed. She refused to practice the technique, and said that "letting go" was much too frightening to her. At that time, I thought that it might be therapeutic for her to experience the sensation of complete relaxation, drug induced, so that she could get used to the feeling of relaxation and be less frightened by it. She consented to an intravenous infusion of brevital. While she was being injected with brevital and while she was speaking to the psychistrist who was administering it, she became, physiologically, extraordinarily relaxed.

I was next door monitoring her autonomic activity on a polygraph. After the first few minutes of brevital infusion her respiration became more regular, skin conductance fluctuations virtually ceased, and her heart rate became slower and much less variable. She also looked quite relaxed. She reported, however, that she was feeling more anxious than she had ever felt in her life. The anxiety continued for the remainder of the day--i.e., for hours after the brevital had completely left her system. Here was an example of what seemed to me to be a clear-cut desynchrony between cognitive anxiety and physiological anxiety. The brevital rendered her physiologically relaxed but cognitively anxious. Interestingly enough, her major problem was successfully treated primarily on the behavioral level. She was eventually hospitalized, and taken away from the home so that she could not possibly clean it up. After a brief hospitalization, her family agreed to participate in a program of limiting her to a few hours of housework per day. If she exceeded this limit, they all agreed to mess up the house again. We also involved her in a part-time program of vocational rehabilitation, in which she eventually assumed some leadership roles in the housekeeping and kitchen departments.

A second case illustrating the desynchronies between modalities of anxiety involved a 32-year-old woman who had referred herself to me for treatment of obesity. It soon became evident that this woman had other severe problems as well. She had only once in her life been on a date, and had almost no friends. She still lived at home with her parents, with whom she did not get along. She still felt traumatized by some sexual advances made upon her by her father when she was 11 years old. After several months of treatment, I tried teaching her Progressive Relaxation, in order to help her to relax without eating, and to begin desensitizing her to the possibility of interacting socially. She reacted quite strongly to the technique in a negative way. She reported fearing that, if she were to relax, she would become uncontrollably hostile and aggressive (rather than meek and submissive as she was) and that she would become uncontrollably sexually loose (rather than totally sexually repressed as she was at the time). Although she wanted to become more assertive and more sexually free, she felt that the prospect of voluntarily letting herself go, through relaxation, was far too threatening. She was, however, an excellent hypnotic subject, and agreed to try hypnotically-induced relaxation. Under hypnosis she reported very deep relaxation, despite the fact that she did not appear to be physiologically--especially muscularly--particularly relaxed. Here was an example of cognitive relaxation but physiological tension. Later in therapy, while she was under hypnosis, I began training her in some aspects of Progressive Relaxation. She reported that she was able to release her muscle tension only when she put herself into the state of deep self-hypnosis I had taught her to enter on her own. She was apparently convinced that hypnosis was "safer" for her because she did not have to do it herself: things just "happened" to her under hypnosis, so she did not have to take responsibility for them. Here was an example of physiological relaxation that was achievable only under a particular cognitive set. She eventually did develop some quite extraordinary physiological control while under hypnosis. Approximately two years after I saw her she again consulted me because she had had a

severe reaction to a novacaine injection at her dentist's office, in which her throat closed tightly and she felt unable to breathe. It had previously been determined that this was not entirely an allergic reaction, but that it had some functional components. She had to undergo some emergency dental treatment. I spent one session teaching her, under hypnosis, how to relax the muscles of her throat. Her symptom completely remitted. She never had, however, learned to be relaxed without the aid of hypnosis.

Different Treatments for Different Forms of Anxiety: Mental Activity, EEG Alpha, and Subjective Effects of Relaxation Techniques

The distinction between types of anxiety perhaps explains why the brief tape recorded Progressive Relaxation instructions are often effective in helping patients to overcome phobias, despite the facts that these instructions apparently have little or no physiological effect. Phobias are, primarily, behavioral disorders. A phobic individual avoids doing things. An agoraphobic individual stays at home, an airplace phobic avoids airplanes, etc. While there may be some physiological arousal and worry or "catastrophizing" done by phobics, the clinical problem is usually that the individual refuses to confront the phobic situation. Indeed, an individual may overcome a phobia without even using a physiologically-oriented technique such as Progressive Relaxation in order to overcome physiological symptoms of anxiety. There have also been a number of experimental reports suggesting that Wolpe's technique of Systematic Desensitization works equally well with or without the use of Progressive Relaxation (Rachman, 1968, Wolpin & Raines, 1966). Although until recently most of these studies have been on college students with minor phobias such as public speaking, examinations, snakes, spiders, etc., some recent English research (Gillan & Rachman, 1974) has confirmed these findings on a clinical population of severe phobics. Thus relaxation may, as Wilson & Davison (1971) suggested, be useful in convincing the phobic patient that it is safe to start approaching the phobic situation, but the critical intervention probably involves changing the individual's overt behavior and getting the patient to approach things that previously were avoided, rather than changing his or her subjective feelings. It appears as though the behavioral avoidance symptoms that characterize phobias are indeed mediated by different processes than are physiological symptoms of anxiety and thus may respond best to different kinds of treatments.

Davidson and Schwartz (1976) have hypothesized that the type of relaxation training clients are given should correspond to the kind of symptoms that they have: i.e., if they have cognitive symptoms of anxiety they should be given a cognitively oriented relaxation technique, if they have physiological symptoms they should be given a physiological technique that works on the physiological system in which the problem is manifested, and if they have behavioral symptoms they should be given a behaviorally oriented technique.

Another dimension along which Davidson & Schwartz categorize relaxation techniques is that of activity. They describe Progressive Relaxation as a technique utilizing both "active" and "passive" control, and oriented primarily to the physiological sphere. The "activity" involved in Progressive Relaxation is, presumably, the focus of mind required to "tune into" the muscle control

sensations. Although "trying too hard" to relax is counterproductive in Progressive Relaxation as well as in all other techniques, there are times early in a person's training in Progressive Relaxation--such as when one is tensing a muscle or paying attention to "control sensations"--when some focused thought and action are required, hence the categorization of Progressive Relaxation as including relatively "active" components.

Some observations of mine and my students lend some support to this description. The first observation involves the effect of relaxation on EEG. EEG alpha rhythms are most often described to occur in a state of relaxed awakeness, in which the mind is not focused on any goal directed activity. Lester Fehmi (1978) has devised a rather unique system for recording EEG alpha, in which he summates the EEG signal over five separate locations, thereby emphasizing in-phase alpha activity in various brain locations. His clinical observations are that the experience of relaxation is deepest when alpha waves are in phase with each other throughout the brain. He tried his system out on me and on my students, and the results were subjectively quite convincing to us. When I personally had the electrodes on and was being given biofeedback for my alpha production, I, indeed, found that I emitted the most alpha when my mind was unfocused and I felt relaxed. When I focused my mind on the control sensations in my muscles, as a novice might do in trying to relax more deeply, my EEG alpha production decreased. Several of my students had similar experiences. These experiences appear to be corroborated by the results of the psychophysiological study I mentioned before (Lehrer, 1978). In normal subjects, Progressive Relaxation produced decreases in percent occipital alpha. The results are not completely clear on this issue, however, because, among the anxious patients, an increase in percent occipital alpha took place during training. Perhaps my patient sample took a more unfocused approach to relaxation training than did my nonpatient sample--or than I did myself.

Our observations on ourselves and on our "normal" subjects are consistent with other evidence that changes in alpha production are not systematically related to changes in anxiety or autonomic activity. Orne & Paskewitz (1974) report a demonstration that decreases in occipital alpha produced by alpha feedback do not affect heart rate or subjective anxiety.

A preliminary study in my laboratory by Michael Nalesnik also found a lack of convergence between EEG and other physiological measures in a small pilot study on Progressive Relaxation. Nalesnik gave six sessions of Progressive Relaxation training to each of five medical students over a six week period. Before and after training he measured EMG from the brachioradialis muscle and the 12-14 hz "sensorimotor" EEG rhythm from approximately the sensorimotor cortex area (C-3 and C-4 in the international 10-20 system). The 12-14 hz frequency is just above the alpha frequency range. Fig. 5 shows that four of the five subjects showed dramatic decreases in EMG--from 14.7% to 83.9%. The fifth subject was suffereing from a sinus headache on the post-testing session, and showed an increase of 5.1% in EMG activity. However, there was no clear change in the sensorimotor rhythm and there was no observable relationship between EMG changes and sensorimotor changes across sessions.

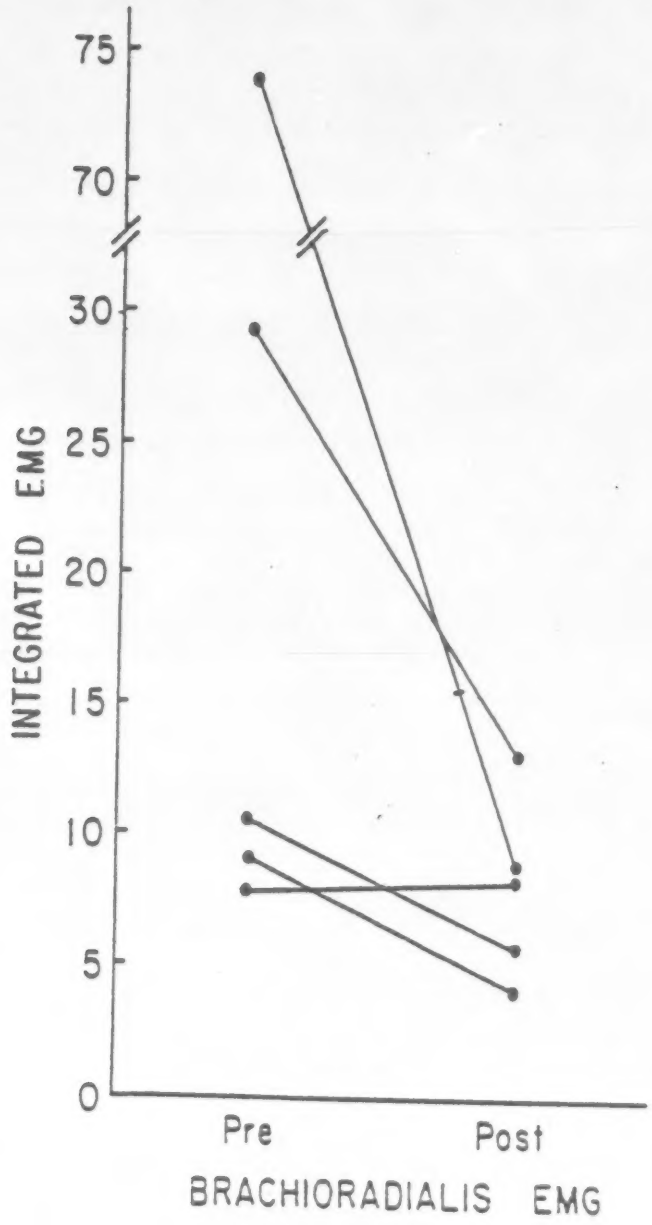

Figure 5. Integrated sensorimotor rhythm (SMR) in arbitrary units (peak-to-peak) for five subjects in Nalesnik study.

These observations were corroborated by a recent study by another student in my laboratory, Saundra Schoicket. She studied normal subjects, in three conditions: four sessions of live group training in Progressive Relaxation, a waiting list control, and four live group sessions in "clinically standardized medtation"--a noncultic variant of transcendental meditation (Carrington, 1977). I conducted the training in relaxation and Carrington give the training in clinically standardized meditation. Schoicket took the physiological measures. This was the first study I had done using group treatment. It was also the first study in which I encountered a significant drop-out rate. Of an initial 12 subjects each in the meditation and control conditions, and 10 subjects in the relaxation condition, five failed to complete the meditation condition, four failed to complete the relaxation condition, and one subject in the control group failed to show up as scheduled. Scheduling problems and the lack of close personal contact undoubtedly contributed to this problem. Also, in a compromise necessitated by the demands of the academic calendar, we had decided to forego a physiological pretest for all subjects, and we tested them only once, several days after treatment. Nevertheless, the study yielded intriguing preliminary data. The physiological test was similar to the one I used in the previous study (Lehrer, 1978). Subjects first relaxed for 5 min. They then heard the five loud tones. At the end of the session they again relaxed for 5 min. In this study we hoped that looking at more relevant physiological measures would allow us to see differences between groups in nonanxious individuals. Hence, in addition to heart rate, we also studied frontalis and forearm EMG, which we expected to be highly sensitive to effects of progressive relaxation; and frontal and occipital EEG alpha, which we expected to be most sensitive to the type of unfocused thinking involved in this particular meditative technique.

Frontalis muscle tension and heart rate were found to be higher in the meditation group than in the other two groups. The main effect for treatment is significant at $p<.03$. However, as in my previous study of "normal" subjects, the relaxation and control groups did not differ significantly from each other, despite our use of supposedly more "relevant" measures in the present study. Although the Progressive Relaxation group appeared to have a lower level of frontalis muscle tension than the control group, the difference was not significant.

The results for heart rate were similar to those for muscle tension. Differences between groups in heart rate were significant at $p<.05$ for the initial rest period and at $p<.04$ for the heart rates immediately before each tone. Heart rate was higher in the meditation group than in the relaxation and control groups. The latter two groups did not differ from each other on this measure.

Frontal EEG alpha, however, showed a borderline significant trend in the opposite direction. A borderline significant ($p<.09$) quadratic trend[1] across groups suggested that the meditation group emitted more alpha than the other two groups for the 15-sec period following the first loud tone. Thus the meditation condition appeared to produce more sympathetic and muscular activity and also more alpha activity than the other two conditions. The relaxation and the control groups--as in our other study of "normal" subjects--did not differ from each other.

Table 1. Physiological Contrasts in Schoicket's Study

Measure	Relaxation	Meditation	Control
Max HR/Epoch Initial Rest	75.8	88.6	75.8
Frontalis EMG End of Session Rest (Arbitrary Units)	47	73	59
Frontal EEG Alpha After First Loud Tone (Arbitrary Units)	18	32	24

This corroborates previous findings of desynchronies between alpha and other measures of physiological arousal, and lends support of the notion that alpha is produced by the relatively passive state of mind involved in clinically standardized meditation, but not as much in Progressive Relaxation. By this logic these data also lend support to Davidson & Schwartz's categorization of Progressive Relaxation as involving more "activity"--at least of the mental sort--than transcendental meditation. Very similar physiological results were recently obtained in a study of tantric yogic meditation (Corby, Roth, Zarcone, & Kopell, 1978).

There were also some findings in Schoicket's studies that support Davidson and Schwartz's theory that meditation should have the greatest effect on cognitive manifestations of anxiety, while Progressive Relaxation should have the greatest effect on physiological manifestations of anxiety. In this study we gave subjects a number of 7-point Likert-type items to rate to describe how they felt during the testing session.

The subjects in the meditation group reported feeling more cognitive signs of relaxation, while subjects in the Progressive Relaxation group reported feeling more physiological signs of relaxation. Subjects in the meditation condition reported experiencing less (at the $p<.05$ level) worrying about their problems and less picturing of future misfortunes and a lower intensity of random, unfocused thoughts than subjects in the Progressive Relaxation group, and more feelings of joy than subjects in the control group. Subjects in the Progressive Relaxation group, however, reported more frequent and more intense feelings of heaviness and numbness than subjects in the meditation group.

Thus, in general, the results of this study support the theory that clinically standardized meditation is a cognitive technique that is most effective in treating cognitive manifestations of anxiety, and suggest that EEG alpha may be an indirect measure of cognitive anxiety. Clinically standardized meditation may produce heightened physiological arousal rather than relaxation under some circumstances. Progressive Relaxation could not be as readily studied because we were looking at nonanxious subjects--despite the use of the "relevant" measure of EMG. There was, however, a suggestion that, from a subjective point of view, Progressive Relaxation has physiological rather than cognitive effects.

I would like to mention briefly one other study done in my laboratory, by Shoshana Adler (Note 4). Adler studied "normal" subjects in a study comparing Progressive Relaxation with Autogenic Training. She also used so-called "relevant" physiological measures: heart rate and finger temperature.

Because Autogenic Training specifically instructs people to warm their hands and lower their heart rates, we had expected Autogenic Training to produce the largest reductions in these two measures. Adler gave psychophysiological pre-tests and post-tests, each consisting of a five minute rest period followed by five loud tones. Between the two testing sessions she gave four individual weekly sessions of training in either Progressive Relaxation or Autogenic Training to groups of 10 subjects each. There was also a 10 subject waiting list control group.

Adler found no difference between groups on any physiological measure, thus confirming our previous experience that physiological relaxation effects cannot be detected among normal subjects using our methods of brief training and testing. (We did not yet have these other findings when Adler started her work.) Subjects in the Autogenic Training group did, however, report feeling some of the physical sensations they had been trained to feel: they reported having experienced significantly more warmth and weight in the arms than subjects in the other conditions.

Interestingly, three subjects in the Progressive Relaxation condition and two subjects in the control condition reported having experienced their arms becoming cooler; although no subject in the Autogenic Training condition did so. Thus here too there is a hint that the two different techniques produce different subjective experiences of physiological function.

Conclusion

We have found that psychophysiological effects of relaxation are most clearly revealed when we give live individual training to subjects who are severely anxious. We have also found some evidence for specific effects of some relaxation techniques. The results give some support to Davidson and Schwartz's categorization of Progressive Relaxation as more "active" and "physiologically oriented" than transcendental meditation--of which Clinically Standardized Meditation is a variant--and to their categorization of Clinically Standardized Meditation as being relatively more cognitively oriented than Progressive Relaxation. The results of our experimental and clinical observations strongly suggest that cognitive and physiological symptoms of anxiety are differentiable, and might be most effectively treated by different methods of relaxation. Our findings also suggest that increased EEG alpha may be a physiological marker for cognitive passivity and relaxation. We now have studies going on in our laboratory with highly anxious people comparing Autogenic Training, several meditation methods, and more intensive training in Progressive Relaxation. Perhaps these studies will further clarify the relationships I have described.

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Footnotes

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[1]A significant linear trend would indicate that relaxation was highest, the control group lowest (or vice versa), and the meditation group in between. A significant quadratic trend would indicate a tendency for the meditation group to be higher (or lower) than the other two groups.

PROGRESSIVE RELAXATION: A 70 YEAR PERSPECTIVE

by

Edmund Jacobson, M.D., Ph.D.

Director, Laboratory for Clinical Physiology

Chicago, Illinois

Banquet Address

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The meeting was opened by Chairman F. J. McGuigan, who stated, "Ladies and gentlemen, members of the Association, it is a pleasure to have Dr. Edmund Jacobson, Jr. with us this evening. He has kindly agreed to introduce his father."

EDMUND JACOBSON, JR., M.D.: It is a happy occasion for me to return from California to this lovely city and to witness the educational opportunities available to us in this center of the United States. It is even more of a pleasure to take part in this meeting of the Association for the Advancement of Tension Control.

It is here, I believe, that my father, many years ago, began to develop the principles of relaxation. This word, I surmise, was first introduced by him to describe what he was hoping to explain to the American people. Dr. Jacobson's single purpose, I think, has been to give us a discipline that is scientific in an era and in a world that has needed a discipline that can be tested. He proposed also to give us the instrumentation and to explore tension control. If there is anything that my father has offered to us, it is a scientific endeavor, a level of thought that I would only hope that someday I could obtain.

As you know, my father has pioneered in this field and has helped innumerable people. If you look at my father at his advanced age, you may realize that he himself is an example of what can be accomplished by the techniques which he has introduced. Permit me now to present my father, Edmund Jacobson.

EDMUND JACOBSON, SR., M.D.: Ladies and gentlemen, members of the Association, it will be my pleasure to try to make the coming half hour of interest to you all. I shall try to do this by recalling the brief history of Progressive Relaxation. It is difficult today to realize that at the turn of the century the word "relaxation" was very seldom used in speech or generally in print. Neither laymen nor scientists even mentioned the word. Doctors were unacquainted with the use of relaxation techniques to relieve nervousness, to save bodily energies and to bring general comfort. Today, relaxation is commonly mentioned in the everyday talk of laymen as well as in the professional use of relaxation as a method of living advocated for purposes of health and as a method of physical action advocated for all forms of athletics, as in playing games and especially for excellence in golf.

The word "relaxation" has in common use several different senses. In common parlance the word "relaxation" generally refers to simple pleasures such as watching television, listening to music, engaging in games and various other forms of relatively quiet activity. Such use of the term relaxation by laymen did not occur at the turn of the century. In fact, a book written on rest by the physician associated with Woodrow Wilson does not even employ the term "relaxation".

Let me emphasize that Progressive Relaxation was unknown during the last century. During the 1880's a well-known American doctor became famous for his treatment of nervous and neurotic states. Dr. Weir Mitchell put his patients to bed and fed them 12 raw eggs per day. His chief purpose was by no means to teach them to rest or to give them rest. He described his methods in a book entitled, "Fat and Blood and How To Make Them". His patients subsisted on a diet which would make physicians today shudder about excessive cholesterol. Doctors and scientists of the last century had not yet learned of the damage to the body that can result from great excess of cholesterol intake.

Today the diet of many eggs which Dr. Mitchell prescribed would be considered by scientists as dangerous to the health not only of patients but also of people in good health. Obviously the famous American doctor who wrote on what he called the "rest cure" had no understanding of muscular relaxation as we know it today.

Indeed as recently as the days of Woodrow Wilson muscular relaxation continued to be unknown. Wilson's doctor wrote a book on rest in which the word "relaxation" was not even mentioned.

Even today laymen generally employ the term "relaxation" in a non-scientific sense. Commonly they say that they relax by watching television or by playing golf. This is an example of the poor English commonly used by laymen. Proper English would require people to say that they engage in recreation upon watching television and upon playing golf.

Today relaxation and Progressive Relaxation have become topics of study and of publication in institutions of diverse types as well as in one or more departments of approximately every university in the United States. Whenever any topic becomes well-known to students or to laymen it becomes natural to assume that the topic has always been known. This is true of relaxation. Indeed, relaxation is an act which occurs in the life of men and animals repeatedly. You raise your arm and you relax it; you walk and afterwards you relax your legs and lie down or sit down. So familiar is this act in human beings and animals that it becomes natural to assume that it must always have been known and recognized. Amazing to relate that until I identified, experimented and wrote about relaxation at Harvard University during the years 1908 to 1910, very little scientific study had been published concerning the let-go of muscles. Perhaps the word was often used in the sense of rest. However, no one had written that relaxation should be learned by human beings not only in the sitting as well as the lying posture but also upon walking or running so far as compatible therewith. Until I began to publish articles and books upon human relaxation the word never attained its present day meaning, namely, economy of nervous expenditures. In the lying posture, relaxation may be attained almost generally throughout the entire skeletal musculature, excepting the respiratory muscles in which rhythmic contraction continues but becomes less vigorous.

In 1907 when I became a graduate student at Harvard University I was amazed at the ignorance there concerning muscular relaxation. President Walter Dill Scott of Northwestern University had recommended to me what he called "a world record breaking department", the Harvard University graduate department of psychology and philosophy. That department was distinguished by the presence of three famous men, Professor Hugo Munsterberg, Josiah Royce and William James. I had considered going to Germany for graduate instruction but my plans were changed by the influence of Walter Dill Scott.

Various surprises were in store for me. The greatest concerned the behavior of William James, who was generally ranked as the world's greatest psychologist and by many also as the world's greatest philosopher of that time. Not only had he written famous volumes on the principles of psychology but also he had written on what he called, "the gospel of relaxation". To be sure, I learned that he had Swedenborgian inclinations. I was quite familiar with his books on psychology, apparently the closest student ever at Harvard. One evening in Cambridge I had telephoned to ask for permission to visit him. I was planning to perform experiments upon the nervous start, the start of surprise which commonly occurs in human beings upon the occurrence of a sudden loud unexpected noise. French psychologists had studied this matter informatively. My father had come from France. Looking back, I now presume that my heredity influenced me. At any rate, the familiar fact that people characteristically jump or jerk when startled by any sudden loud noise led me to continue French efforts to make a scientific study of nervous behavior.

I was accorded the honor of a personal visit at the home of William James. To my amazement during our discussion he sat part of the time with his beard nervously in his mouth, part of the time with his beard out of his mouth, alternating quickly between these two procedures. If he tried to follow what he had named the "gospel of relaxation", he illustrated it fantastically. Not only did he fail to sit still for as long as 60 seconds (I don't see anyone of you in this entire audience failing to sit relatively still), not only was he unable to emulate what you are now doing, but his impatience was unending. "Why don't you experimental psychologists study the whole man?" he asked petulantly.

It was quite obvious that the man known as the greatest psychologist in history manifested his own inability to relax. Obviously he was in no condition to advise me properly about relaxation.

Outside of my own clinic I have never seen any individual as neurotic as William James.

Another surprise was in store for me. Professor Hugo Munsterberg was the head of the Department of Psychology at Harvard. In Germany, he had personally known the Kaiser. While fearful, the British and their allies had not yet opposed German military aims. Accordingly in 1907 Hugo Munsterberg could relate proudly of his pleasant relationship with the Kaiser. Professor Munsterberg was a very kind man but greatly depressed much of the time by personal criticisms of his publications. Soon after the opening of war with Germany, he was stricken while teaching and died in the classroom.

Returning to the topic of relaxation, permit me to repeat that when a subject has attained general interest, people tend to believe that this has always been the case. Permit me also to emphasize again that what relaxation means to most people today was not known until my studies were published at Harvard. Historically, as early as 1850, a French sculptor wrote about what he called "decomposing exercises", which meant to him a way to relax. To illustrate that muscular relaxation was generally unfamiliar to physicians

before 1910, the doctor who attended President Wilson wrote a book on rest in which the word "relax" is absent even in the index. This illustrates that relaxation and Progressive Relaxation were practically unknown until recently. To be sure, upon examining their patients, doctors would request them to "relax". However, there is no evidence that the doctors of former days themselves relaxed. Indeed, if I could believe that there are no doctors in this audience I might venture to say that the doctors of today, generally, not including those present, continue to be ignorant of muscular relaxation. Indeed the conception of relaxation generally today among laymen and even physicians appears to be 'to take things as they come', 'to take a moderate interest in things', 'to take it easy'. Even today, then, the common conception of relaxing is quite different from muscular let-go.

Technically, relaxation and Progressive Relaxation is a cultivated skill of employing voluntary muscles. Approximately there are 1,030 muscles in the human body that can be moved at will, not individually but in groups in the performance of bodily acts. In health voluntary muscles generally make up somewhat less than 1/2 the weight of the healthy body, often 45%. I repeat that these are muscles with which you perform what you do at will. The "will" has never been defined heretofore. I venture to define it now as man's ability to contract and relax the muscles outside of his skeleton in accordance with his purposes. These muscles are also called "skeletal muscles". When a thin section of any skeletal muscle is viewed under a microscope, it appears striated. Any and every striated muscle can be tensed and relaxed at will. However, most muscles can be voluntarily contracted or relaxed in groups only, but not in isolation. In other words, most muscles contract and relax upon activities in groups. Only a few striated muscles can be contracted and relaxed alone.

If people commonly were as greatly interested in health energy expenses as they are in dollar expenses, they would become interested in scientific study which measures energy expenses. It has been one of my foremost interests to measure human energy expenditures. Historically, I showed that muscular energy in man and animals can be measured. In fact, one of my greatest interests in life was to invent an instrument for such measurement. I succeeded in inventing the integrating neurovoltmeter with the benevolent aid of the Bell Telephone Laboratories, well-known as the greatest electronic laboratory of the world. The officials of these laboratories opened their entire facilities to me personally, an opportunity never extended to any other scientific investigator. Two of their famous presidents came to Chicago to visit my laboratory and to learn to relax technically.

I owe this collaboration the means for the scientific study of activities of human beings and animals.

In the present audience are many who have practiced at relaxing their own muscles and who have subsequently taught others what I named "Progressive Relaxation". It has become well-known that the teaching and the learning thereof should be orderly. With eyes closed lying comfortably on his back the beginner is requested to bend his left hand back at the wrist as I do now. While so doing he is requested to observe the sensations from the muscles on the back of his left forearm. These sensations are to be called "sensations of tension". For

brevity, they are called "tension". After the terminology to be employed has been indicated, the beginner bends his hand back once more with eyes closed. Again he is to observe the sensations called "tenseness" in the back of his forearm. To help beginners and others to learn to relax, I wrote a book published by the McGraw-Hill Book Company entitled YOU MUST RELAX. The word "MUST" is to be soft-peddled.

When in 1908 at Harvard University I began to measure muscle tension and muscular relaxation, muscle states had never yet been measured accurately. Accordingly, one of my tasks was to determine how they could be measured. I assumed that I would need an instrument capable of measuring electrical changes as low as 1 millionth of a volt. In the quest of knowledge to help me contrive an instrument of great sensitivity, in 1921 I traveled to St. Louis to visit Professor Gasser who later became head of the Rockefeller Institute. He was one of the chief scientists of the United States. I told him that I wanted to measure muscle tension. I said that one possible way would be to put the whole person in a "braun tube", an example of which is your own television tube for which you pay $200.00. When I told the professor that I needed to measure as low as one microvolt he looked at me with eyes widely open. "A microvolt! I think that's a millionth of a volt. I take my hat off to a microvolt!" Clearly, he had no information to give me. Accordingly I said "Goodbye!" most cordially. Nevertheless, luck was with me, especially because I had known the professor of physiology at Columbia University.

Since this is an after dinner talk, I ask you to permit me to deviate from my story, in order to tell you about an amazing experience of this professor. He related that one afternoon upon looking out of the window which overlooks his backyard, he saw his cat suddenly give a kick stiffly backward. This appeared very odd to him. Amazing, several weeks later, like the cat, he also kicked his leg stiffly backward. Thus he had a problem to solve about himself as well as about the cat. He succeeded in learning that the stiff movement of himself and of the cat was due to arsenical poisoning. He found that it was due in himself to eating broccoli. So he learned and I learned and now you have learned that you should not serve broccoli unless you have soaked it for 2 to 3 hours in cold water containing vinegar. This will be required so that you and your children will not be seen in your backyard kicking stiffly backward. Whether a cat or a professor kicks back stiffly, it is an act of extreme tension. This illustrates how very tense certain drugs can make you. Also there are certain drugs which can to a considerable extent, relax you. However, why should you take a drug to relax, which acts with a somewhat poisonous effect, even if relatively harmless, when you can learn to relax with ease without taking any drug? This is a field which Professor Joe McGuigan teaches. Indeed he is the principal teacher of relaxation in the United States.

Permit me to return to my story of my experience at Harvard University graduate department in philosophy and psychology where I remained for three years from 1907-1910. To my regret and amazement I found that the three most distinguished professors in philosophy and psychology were very knowledgeable but also very theoretical. To my dismay, I gradually came to realize that not one of the three professors, James, Munsterberg, and Royce was a thorough scientist. I was only a boy, but as you all know, you don't need to teach a fish to swim. From the outset at Harvard, my studies, sad to relate, were unfortunately unique. As I previously said, you do not need to teach a fish to swim. The very first experimental study which I performed at Harvard

was as precise as I could arrange today. Accordingly with precision I undertook the first studies made on relaxation in man and in animals. To learn to relax or to learn to be a teacher requires much time. Today we might generalize that a healthy average person desiring to learn to play successful golf requires as a rule daily practice for at least a year. Similarily, a normal person in good health might expect it necessary to practice an hour a day, not at bedtime but breaking up the day, for one year. Obviously, learning to relax requires time. Imagine devoting an hour a day (not at bedtime) for at least one year, to learn to relax! Is it worthwhile? I would forceably answer,"Yes!", and I would express the hope that doctors and the public may soon generally realize why it is well worthwhile for health to break up each day with one hour a day with technique.

Let me emphasize why this is true. In my experience, the most common maladies of mankind suffered by Americans in cities, on farms, and elsewhere are tension disorders. These are more common than the common cold. Tension disorders manifest themselves in symptoms which everybody has experienced but seldom are they recognized as tension disorders. Some varieties often are treated by psychiatrists. Indeed the patients of psychiatrists usually are excessively tense individuals. The psychiatrist does not call their maladies "tension disorders" but refers to them as "psychiatric disorders". The medications prescribed commonly tend to poison mildly some sections of the brain or of the nervous system. A nerve quietener is always a poison: a very mild one, but still a poison. Wines and whiskeys, which you may use on your own dining table, can be included in the class of very mild poisons. Unfortunately some turn to the marijuana and other poisonous drugs of today. Many of these excite the individual emotionally. It is unfortunate that many such drugs today are in present vogue.

"Stress" is a word commonly used in scientific and medical journals. I regard it as a very poor term. The well-known Canadian, Hans Selye, has written widely of "stress" produced in various manners. In animals he has produced stress by applying croton oil to the skin until it produces an ulcer. Dr. Selye discusses what he calls "stress" produced in human beings when moving in airplanes 2 or 3 times the speed of gravity. To Hans Selye stress means such misfortunes as operation, freezing, burning and any severe injury. In short, the term "stress" is used in many different meanings, including emotional upset.

Let me emphasize that while Hans Selye has investigated fields of stress not associated with any of my own developments, he has informed me of his interests in my studies and he realizes that I am interested in his different studies, although not related to relaxation.

Let me emphasize here that the term "stress" applies to many different types of organic influences. These influences include some that tend to injure the organism and some that do not.

I have come to the end of my available time and with my best wishes to you I hope that we may meet again next year.

QUESTIONS ADDRESSED TO DR. JACOBSON

Q. WOULD YOU SAY A WORD ABOUT TITCHENER?

JACOBSON: In 1910, after I had received the degree of Ph.D. in psychology and philosophy at Harvard, I went to Cornell University as honorary fellow in the department of psychology. E. B. Titchener was the head of the department. At the beginning of the summer when we played tennis, he generally could not get a ball across to me. At the end of the summer, I couldn't get a ball across to him. He had been champion in tennis at Baliol College but had become rusty and needed months of practice in order to regain skill.

Titchener was an amazing man. He did not visit his laboratory all year but remained at home for the most part or in the woods picking mushrooms. Also he spent much time at home playing on the piano. My purpose in going to Cornell was to secure better graduate students. I assumed that I could teach the graduate students in psychology and the younger instructors to observe and report on what takes place in their bodies upon reading and upon perception in general. I believed rightly that Cornell graduate students were teachable as the Harvard graduate students in psychology were not. Accordingly I arranged a series of studies of perception during reading and other activities, in which the results could finally be quantified. During the year Titchener paid no attention to my study or to any others in his laboratory. At the end of the college year, he became interested in my studies of meaning and understanding, but only because his department at Cornell had been criticized by other psychologists including Professor Ogden for neglecting meaning. Stunned by the criticism, Professor Titchener called me to his home and said, "Ogden has accused us of neglecting meanings! You haven't neglected meanings!"

Accordingly he asked me to write an article for publication in his journal of psychology, entitled "On Meaning and Understanding". However, he insisted that psychology does not deal with meanings of words and sentences. He insisted that any study of understanding and meanings could never be a study in psychology, but properly belonged in the field of logic. He argued that the proper interest of psychologists lay in the study of nonsense syllables, such as ausk, maus, cout, and others. Meanings, he repeated, were not the subject of psychology but of logic.

To me, such views on the part of Titchener seemed amazingly confused. Titchener had translated into English the German book on physiological psychology written by Wilhelm Wundt, whom he and other psychologists considered the founder of the science of experimental psychology. At the end of the college year Titchener came to the laboratory to take part in a seminar on the nature of psychology. My duties at the seminar included the comparison of German and American views. In this capacity I found it necessary to consider Titchener's translation of Wilhelm Wundt's book on psychology from German into English. I found that Professor Titchener failed to understand and to translate properly the words of the German author into English. I found that Professor Titchener missed the meanings stated in German. At about the same time, I was led to read translations made by other Englishmen from German into English. I was led to conclude that the English fail to translate accurately from German into English. On the other hand, in my experience, the Germans have always been admirers of the English and generally translate from English into German very precisely.

At the end of the summer, however, after Professor Titchener recovered his skill at tennis through repeated practice, he beat me sadly. Unfortunately, I have never had professional training at tennis and I had to rely upon my speed of reaction, which was very fast. During the year after I left Cornell for the University of Chicago, Titchener had his graduate students allegedly repeat experimental studies on meaning and understanding. I know of no more confused literature in any field of so-called science than the publications that came from Cornell during the year after I left.

THE NEXT QUESTION from the audience concerned the cautions and challenges in training people to relax and in making scientific measurements in that field.

JACOBSON: The studies of muscular tension and relaxation in order to be scientific must be performed with proper instruments of measurements. The instrument in use for many years in our Laboratory for Clinical Physiology was built by the Bell Telephone Laboratories in full cooperation with me and presented to me as a gift. I have had to perfect it. There is no instrument on the market which is at all comparable and adequate in accuracy and complexity. However, in our laboratory our technician, Richard Lange, has designed and constructed a small but accurate integrating neurovoltmeter. It likewise measures accurately electrical values down to a 10 millionth of a volt. We have tried to find an instrument maker who would make this instrument and supply it according to our directions but to date we have been able to supply only a few simple models. In the field called "Biofeedback", it is commonly agreed that the instruments employed all are modeled upon instruments in my laboratory. However, the views and principles of leaders in the field of Biofeedback are of their invention and do not derive from our experiments.

Sensory Awareness Relaxation Training

by

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It is generally understood that Progressive Relaxation is one of the most widely used methods of relaxation training. Considerable research has been conducted to compare the effects of Progressive Relaxation with other techniques including biofeedback. The results have generally been equivocal, perhaps because Progressive Relaxation is not well understood by most professionals who utilize it.

Clinical psychologists and behavioral therapists have used biofeedback together with tape recorded instructions of Progressive Relaxation purportedly ala Jacobson. In my opinion, the majority of these tapes do not even resemble Dr. Jacobson's classic technique.[4] Rather they represent an attempt to condense a long and painstakingly gradual therapeutic process into a "quick and dirty" exercise session.

The following is an example of the taped instructions. "Will you make a fist with your right hand. Make it hard, harder and then let go. Do the same with your left hand. Now relax it. Tense up your right leg, harder and then let go . . . etc."

When Dr. Jacobson taught a patient Progressive Relaxation he spent an entire one hour session on a single muscle group. He allowed considerable time between instructions wherein the patient reflected upon the absence of sensation as the tension diminished or fluctuated. He instructed the patient to make contractions of varying intensities and duration. Great importance was placed upon the release of tension. The patient was encouraged to release tension quickly and completely, thereby allowing the hand, arm or foot to return to the supporting surface without additional contraction of the opposing muscle group.

None of these considerations are included in any of the tapes that I have observed. Thus the taped sessions resemble calisthenics much more than Progressive Relaxation as Dr. Jacobson taught it. I perceive this misinterpretation of Progressive Relaxation to be a major problem. If physicians and educators are not able to motivate patients to make a long-term commitment to a methodical (step-by-step) progression toward smaller intensities of muscle contraction, then a transfer effect to the "real world" can never be achieved. By transfer effect, I mean the learning which enables the patient to automatically release unnecessary tension in daily activities.

Anxious Cognition Disrupt Relaxation Process

Students and patients who have never experienced a complete relaxation response do not have sufficient appreciation and confidence in the procedure

to make that long-term commitment necessary to effect treatment. Similarly, the therapist may lack the experience and confidence with the traditional Jacobsonian technique to go through the long, slow process which does not provide immediate rewards for the patient. The therapist fears that the patient will lose interest and discontinue treatment. In desperation the therapist rushes through a series of exercises which seem to provide subjective benefits, but do not facilitate awareness of tension/relaxation states. Awareness of muscle tension has been shown to be essential in the development of skills in relaxation.[8]

Jacobson[5] reported that "attention" requires muscle tension, and as relaxation advances then attention diminishes. The crucial problem is that the person's mind wanders, disrupting the muscle relaxation process. From the patient's perspective the big question is "How do you achieve some degree of relaxation so that attention can diminish, thereby facilitating complete relaxation?"

The result is a vicious cycle wherein the novice participant has great difficulty achieving the initial relaxation necessary to diminish attention and thereby appreciate the ultimate goal. Mind wandering (day-dreaming) and problem solving are very important problems for the novice participant. Dr. Jacobson called these cognitions "anxious reflection."[5]

Since considerable muscle tension exists concurrently with these anxious reflections, there exists a major impediment to the sought-after goal of a relaxation response. It is like a big hurdle that one has to get over before actually achieving the desired treatment effect.

It is also important to note that attention and concentration are counter-productive. When the patient concentrates on a muscle group to make it relax, it is likely that higher tension levels will result. Since mind wandering perpetuates the muscle tension, how can the therapist overcome these major hurdles to facilitate the level of relaxation necessary to justify the patient's continuation in extensive training?

Rather than active concentration, perhaps passive attention (diffuse attention) or cognitive diversion is necessary temporarily to achieve some degree of relaxation response. The patient must experience some degree of relaxation to satisfy motivational needs. Therein lies the rationale for the development of an adjunct procedure to be used prior to Progressive Relaxation training.

Sensory Awareness Relaxation Training

At the outset it is necessary to provide the rationale for why this procedure was developed. I teach courses in a health education curriculum and only recently have I been able to initiate a tension control course. Until this time, I have had limited access to a captive audience for an

extended period of training. Therefore I was forced to produce an experience for 20 to 40 students in one or two sessions which would motivate them to enroll in a community-based fee-for-service course.

It is important to note that this requires quality salesmanship. The awareness of physiological relaxation is not apparent in this population. It was necessary to provide these potential participants with the opportunity to experience some degree of relaxation in only one or two sessions. The purpose was to achieve motivation and identification of the ultimate goal such that they would then make the long-term commitment to Progressive Relaxation training. The purpose was also to provide the clinician or the educator with an introductory module which would facilitate early success and also facilitate more rapid learning of that "control sensation" utilized in subsequent Progressive Relaxation training sessions.

Population

Twenty-eight male and female university students in a health science course were arbitrarily assigned to two treatment groups. The sensory awareness relaxation training (SART) group received detailed instructions in the experimental procedure. Participants in the control group were assigned to other behavioral strategies including weight reduction and smoking cessation.

Experimental Treatment

Initially it was important to have the participant in a comfortable position in order to experience a relaxation response. The students were lying supine with the lower legs elevated to relieve the strain on the lower back. In this position the ilio-psoas muscle is under much less tension. A platform six to eight inches high was used to elevate the legs off the ground. Secondly, it was necessary to place a textured material in contact with the subject's hands and forearms. A towel or sheet was interwoven between the fingers and wrapped around the hand. Lastly, it was necessary to provide the subject with a means of avoiding day dreaming, and also to emphasize awareness of total body sensations.

Under these conditions, the participants were getting continuous proprioceptive feedback from every part of the body particularly from the hands. Then the participants were asked if they could feel the towel between their fingers. Other questions included, "Can you feel the texture of the towel over the back of your hand, can you feel the shoes on your feet?" The answer was usually yes.

Then the instructor introduced a method of cognitive diversion. Participants were asked to count a specified number of breath exhalations. The purpose was twofold. First to insure that participants were breathing regularly and getting sufficient respiration. Restricted breathing is commonly associated with tension build-up. Secondly, it provided the participant with a method of passive diversion from daydreaming about various anxious cognitions.

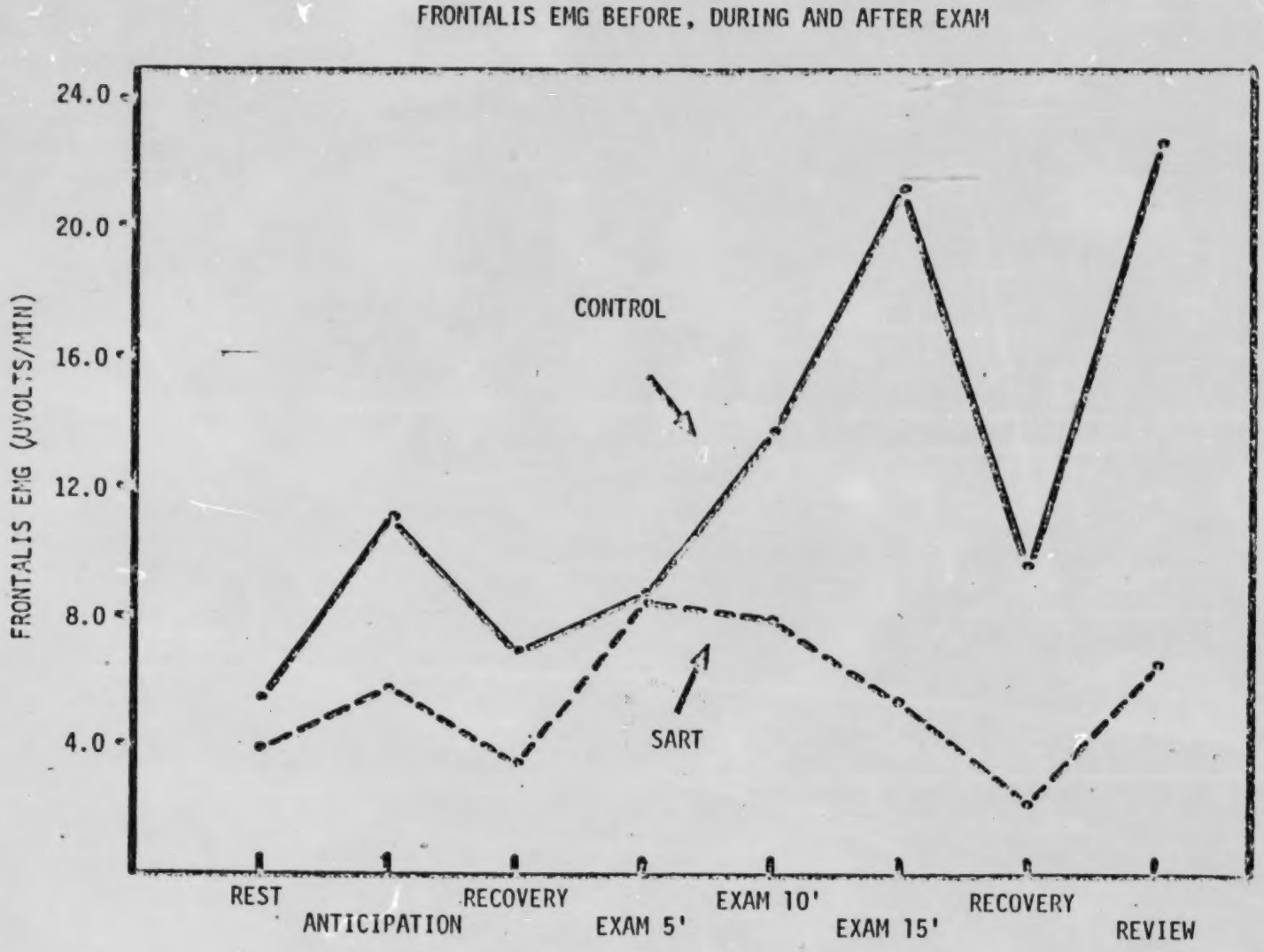

Figure 1. Group Mean Frontal Area EMG Values for Sensory Awareness Relaxation Training Subjects and Control Subjects, Before, During and After Examination.

After five minutes the participants were asked the same questions about proprioceptive feedback. Without moving the hand, they were asked if they could determine the position of the hand (pronated or supinated) or whether they could feel the texture of the material wrapped around the hand. In most cases the answer was negative. In this way the absence of sensations was associated with a certain degree of relaxation.

For the first time, these students had a recognizable indicator of relaxation. That indicator was, of course, the absence of proprioceptive feedback. At this point, more meaningful kinds of passive diversions were incorporated. The participants were asked if they could note a difference in proprioceptive sensations between the left and right hand, between the right and left foot and eventually between the hand and the forearm. In some cases, there were more sensations from one hand or the other. Usually there were recognizable sensations emanating from the forearm or elbow where it was in contact with the surface of the floor. Pressure sensations from the elbow were not often reported. After some period of time these would subside, as well.

At this point a systematic circuit of checking was introduced whereby the participant was asked to make determinations of the differences in sensations in each of four segments of the body (right arm, left arm, right leg, left leg). Discrimination progressed from distal to proximal until nearly all somatic proprioceptive sensations were absent. Obviously several sessions were required to achieve this state which presumably was associated with maximal relaxation.

Experimental Testing Procedures

All participants from both groups were tested in the laboratory in a single session before, during and after several task performances including a final examination. Frontal area EMG, heart rate and skin resistance were monitored continuously. The instrumentation was located in an adjacent room. The experimentor could view the participant through a one-way mirror and could communicate via an intercom. Data were recorded at rest, in anticipation of the exam, at three points during the exam and during the recovery period following the examination.

Results

Figure 1 shows the frontal area EMG values for the SART group and the control group before, during and after the examination. There was no significant difference between the groups for EMG at rest. Analysis of variance (groups x trials) showed a significant difference across time. Subsequent post-hoc t-tests showed a significant group difference ($p<.05$) at all points except at rest and at five minutes into the examination. Figure 2 shows the examination results for both groups before training at midterm and after training at the final. The SART group showed a marked improvement in exam

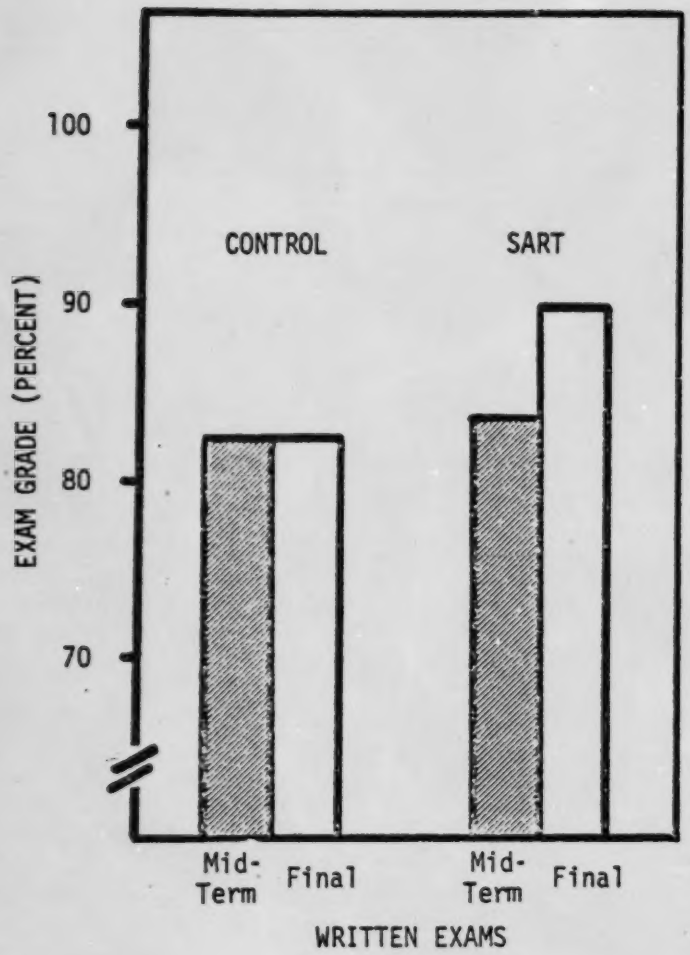

Figure 2. Group Mean Grades (per cent) at Midterm and at the Final Examination for Sensory Awareness Relaxation Training Subjects and Control Subjects

grade, whereas the control group was unchanged. These results clearly showed that the SART group was less tense than the control group throughout the test procedure and that the grade performance was apparently enhanced. This study was limited because pretreatment measurements were not obtained. It is possible that the SART group was also less tense than the control group before onset of treatment.

Discussion

The role of the patients' cognitions during relaxation is gradually becoming recognized as an important factor in treatment. Meichenbaum has suggested that the clients' self-statements and images are crucial in determining the effectiveness of relaxation therapy.[7] The patient can enhance or disrupt the therapeutic process by the nature of his or her cognitive thought processes. Foulkes and Fleisher examined mental activity in relaxed wakefulness by a mentation retrieval process.[2]

In a relaxed situation subjects were monitored for electroencephalogram and electrooculogram changes following a spontaneous interruption and recall of pre-signal thoughts and visualizations. Hallucination-like experiences were reported and it was apparent that there was little difference between day-dreams and night-dreams. It seems obvious that treatment procedures must include some attempt to avoid these cognitions in order to maximize therapeutic results.

Sensory awareness relaxation training has been proposed as one method of handling cognitions during relaxation training. It should be noted that autogenic training and meditation capitalize upon this aspect by utilizing self-statement in the form of mantras or phrases to suggest warmth and heaviness. The advantage of SART is that the cognitive diversion is meaningful in terms of somatic awareness, particularly regarding the sensations (or absence of sensations) associated with both a tense and a relaxed state.

Sensory physiology, as described by Guyton, is of great importance to the theoretical basis of SART.[3] The instructions utilized in this procedure pertain primarily to the exteroceptive sense organs and to the mechanoreceptors (touch, pressure, pain). The loss of sensations which occurs during treatment is due to adaptation of the receptors. Some of these sensations become extinct rapidly and others very slowly. The tonic receptors, particularly the muscle spindles and the Golgi tendon apparatuses, adapt very slowly, if at all. These keep the central nervous system appraised of muscle contraction and joint activity continuously. Therefore muscle relaxation must be nearly complete before the individual loses conscious awareness of body position.

Much additional research is needed to examine the relationship between kinestic sensations and relaxation. Therein lies the key to future advances in the development of better relaxation techniques. It is also likely that the capacity for remarkable pain tolerance in selected individuals is related to a large reduction in excitatory signals which also facilitate afferent inhibition. It is logical to assume that mediation of muscle tension regulates the intensity of excitatory signals in surrounding tissue thereby facilitating pain tolerance.

It is of great importance to this author, that SART is viewed as an adjunct procedure to preceed and to facilitate more efficient training in Progressive Relaxation. It has not been developed as a separate and distinct procedure to substitute for Progressive Relaxation. The nature and effectiveness of Jacobson's technique is based upon the sensory discrimination of the patient.

The Weber-Fechner law is useful in describing this phenomena.[6] This principle focuses upon the individual's ability to judge minimal changes in stimulus strength. The ratio of change in stimulus strength required for perception of a change remains constant across wide ranges of intensity only for visual, auditory and cutaneous sensations. In contrast, kinesthetic stimuli from muscles and tendons are not perceived in a linear fashion, particularly when the background sensory stimulus noise is high.

This point is crucial in determining the appropriate character of Progressive Relaxation instructions. It means that the development of highly discriminate awareness of muscle tension cannot occur when the level of existing muscle tension is high. The ultimate purpose of Progressive Relaxation is to develop finely discreet awareness of muscle tension at very low levels so that the individual can recognize a small unnecessary elevation of tension and release it. Therein lies the utility of a procedure such as SART. It is to facilitate training at a level closer to the desired endpoint, i.e., minimal tension.

In summary, the results of this investigation have shown that SART may be an effective procedure to reduce muscle tension, to improve exam performance and to enhance sensory discrimination. It is suggested that SART should be utilized as an adjunct technique preceeding Progressive Relaxation in order to minimize disruptive anxious cognitions and to enhance sensory awareness.

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Psychosomatic Dentistry and Tension Control

A Physiologic Approach

by

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We are well aware that disorders created by excessive tension plague millions of people. Tension disorders have now become a new classification in medicine.

Tension disorders include states of fatigue, insomnia, nervousness (functional nervous disorders), and anxiety states. They also may be seen as leading to, or in combination with, diseases involving development of organic pathology, including essential hypertension, irritable colon, spastic esophagus, peptic ulcer, coronary episodes and certain psychotic conditions.

There is also extensive evidence that excessive nervous tension is responsible for many dental disorders. The correlation between anxiety states and dental disease is an accepted fact.[1,2]

Real Meaning of Tension

Tension is mentioned frequently in scientific literature and still oftener in popular books, magazines, and daily newspapers. The real significance of the term is left to the reader's imagination. Tension is often confused with "stress." What does the term "tension" really mean scientifically?

Tension refers to effort states when excessive. Any real effort is accompanied by emotion appropriate to the situation which is confronted. Tension or effort and likewise emotion always includes contraction patterns of the skeletal muscles involved. These patterns can be recorded in terms of action potentials with the integrating neurovoltmeter.[3]

Muscles contract during effort because the muscular system, alone of all body systems, is capable of effecting changes in the situation. This is in accordance with Newton's Laws. The brain and nervous system cannot bring about dynamic effects, as they are incapable of motion.

In the intact organism, however, the brain and nervous system invariably participate during effort or tension. Therefore, effort involves action in the brain as well as in dynamic musculature.

In short, then, in tension states there is excessively high activity in muscles and nerves.

Dentist's Role in Therapy

Since numerous dental disorders are created by neuromuscular tensions, it is evident that relaxation of these tensions is the direct route to

effective treatment. This therapy is scientific muscular relaxation. The approach, based on neurophysiology, is known as tension control.

Patients with dental disorders created by tension do not need psychiatric care, sedatives, or other procedures.[4] They are mostly fine people, intelligent, successful and stable. However, they are unaware that their distress is caused by neuromuscular hypertension complicated by pathological habit formation. No one has taught them how to recognize this phenomenon within themselves, and how to eliminate or control its harmful effects.

The time has arrived when it will be necessary for the dental profession to render something more than mechanical restorations and surgical procedures within the oral cavity. A dentist should realize that when he renders any dental service he does not treat an isolated mouth; there is a person attached to the mouth. He treats the whole personality, not merely dental tissues.

Dr. Kaplan states, "Patients come to see a dentist because they are concerned with dentofacial pain, oral inflammatory processes or dentofacial deformities. They come with full recognition that the dentist, fortified with his scientific knowledge, surrounded with the culturally accepted concept of an authority and the aura of a healer, will take care of all the pain and suffering whether it be of physical or psychological origin. It makes little difference to the patients that the origin of the dental suffering may be related to some emotional conflict. They still expect the dentist to take care of them."[5]

Therefore, it is the dentist's responsibility and duty to treat patients who suffer with dental disorders created by excessive nervous tension. He can render this type of therapy by learning the science of tension control as part of his education. This knowledge he can readily acquire with his academic background of anatomy and physiology.

It is hoped that theoretical and practical courses in the science of tension control will eventually become requisites in all dental schools.

Tension Control Discussed

Tension control is a method by which persons can learn to relax their bodies and minds.[6,7] It is based upon extensive research of many years at Harvard University, Cornell, and the University of Chicago. Through this method, people also can learn to conserve their energy in the interest of health and personal efficiency. It is a science based upon sound physiological principles applied to neuromuscular engineering.

Suggestion, hypnosis, or reassurance have no place in this specialized therapy, for these approaches cultivate dependence and are, therefore, directly contrary to the purposes of the method.

In patients dependent upon tranquilizers and sedatives, the purpose of therapy is gradually to enable them to discontinue these measures as they become unnecessary. It is realized that these drugs act only as palliatives. Like aspirin for headache, they fail to remove the basic cause. They fail to penetrate to the source of tension disorders, namely, what occurs in the brain and nerves of the patient, who as active agent of this ailment is chiefly responsible for his malady. Only the patient can stop and eliminate the high nerve tension within his organism. To accomplish this at the source is the aim and goal of tension control physiology.

Modern Concept of the Mind

In the light of present knowledge in the field of physiological psychology, we must abandon the current but antiquated view about the human mind that assumes that "someone" exists within the skull issuing orders to the body, and that muscles merely express what this "someone" thinks and feels. Dentists and other members of the healing arts are called upon to familiarize themselves with the newer understanding of brain action, particularly that "ideas" do not exist first in the brain, but instead that every mental and emotional act involves a bodily circuit which includes brain cells and fibers, nerve cells and fibers, and muscle cells and fibers. These all act together in phases which occur approximately at the same moment.

Present day physiology recognizes that brain action is indispensable, but nevertheless is insufficient for thinking, for emotion and for effort. In itself, the brain does not and cannot think, emote, or make effort. The action of the mind does not occur in closed circuits in the brain, as the traditional view would have us believe. This concept which has been handed down from the last century was supported by no physiological evidence even then.

Present day psychophysiology, contrary to the traditional view which unfortunately is still widely prevalent, stresses the role of the musculature. The internationally famous physiological psychologist, Dr. Edmund Jacobson, has specific evidence that in each and every form of mental act there occurs a specific but transient and changing neuromuscular pattern.[8] It can be stated, therefore, that the mind's action, whether thinking, imagination, recollection, effort or emotion, is directly measurable as the action potential traffic in skeletal musculature. In popular terms, we can state that this interchange within our neuromuscular system is the measure of our efforts to adjust to meet the vicissitudes of life.

Tension Control Technics

Knowing the general physiology of effort in the modern sense enables the therapist to follow the technics of tension control, and to apply therapy directly to the source of tension states. This also includes emotional phases, for, as previously stated, emotion does not occur exclusively in the brain but always includes an effort state, the physiology involving contraction of skeletal muscle fibers. What he needs to accomplish, then, is to train his patient to control the skeletal muscle states, his effort patterns, not only during rest but also during his daily activities.

The patient is taught to determine his muscular contractions through direct operation of the neuromuscular controls which reside in the muscle spindles. The sense-organ which a person must learn to apply in order to operate from spindle controls is the sensation which is always aroused upon muscle contraction. This feeling in the muscles is known as the muscle-sense of Bell. The experience also is known as the "control sensation."

Much of the training toward tension control is devoted to teaching the patient to become familiar with the control sensation, whether strong or mild, in the various regions of the entire skeletal muscle system. Then he is trained to relax his entire skeletal musculature. For this, he needs to practice about one hour each day until he has completed the course of instruction.

The patient is instructed progressively to recognize and to relax tension in the principle muscle groups of his arms, legs, trunk, shoulders, neck, forehead, brow, eyelids, and eyes.

When he learns to relax the muscles of the eyes to zero levels (as checked by electrical measurements and other indications), he finds that his emotional state subsides entirely. The reason for this is that during emotion, or at least preceding this mental act, the individual sees in imagination what excites him emotionally. In short, visualization commonly is the trigger for emotion. Thus learning to control visualization serves the purpose of enabling the patient to gain a certain measure of direct control of his emotional states, including his fears and anxieties.(9)

Following control of the eyes, the patient is trained to observe the controls of the musculature of speech. These are chiefly in the tongue, lips, cheeks, jaws, throat, chest and abdomen, including the diaphragm. He is taught to observe what takes place in his speech muscles during imagination, commonly called "inner speech." After he has learned to observe that thinking actually involves his speech muscles, he is trained to relax his speech parts to such an extent that inner speech no longer takes place.

Finally, he learns that when he controls his eye and speech tensions, reducing them toward zero level, the thinking process and emotional activity no longer take place.

The course in tension control is usually in two stages. In the first stage, the patient is trained in the lying posture. The second portion of instruction is given in the sitting position.

Comment

Education in tension control is appropriate for healthy persons as a prophylactic measure to prevent tension disorders of various kinds, as well as for those persons who manifest a variety of tension maladies.

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Effectiveness of a Short-Term Stress Management Program:

A Preliminary Report

by

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Introduction

The course of a client's rehabilitation is frequently adversely affected by an inability to effectively cope with stress and anxiety. Optimal rehabilitation of anxious clients requires that some form of stress management training be incorporated into their treatment programs. Individuals, who premorbidly had related socially in an acceptable manner, have the most frequent sustained rate of remission from chronic anxiety (Raskin, Rondestvedt, & Johnson, 1972).

The onset of physical disability, however, is a severe stress which frequently alters an individual's social relationships significantly and leads to excessive anxiety. In such cases, the individual must adapt to social roles in which no previous experience has been provided. This unfamiliarity serves to further exascerbate the level of experienced anxiety.

A short-term stress management program for physically impaired clients has been developed at the Curative Rehabilitation Center, a comprehensive, outpatient rehabilitation agency in Wauwatosa, Wisconsin. The results of the program are assessed in this study.

Literature Review

Arousal is the physiological state which accompanies anxiety (Malmo, 1957; Geer, 1966). Anxiety is more than arousal, however, and may best be defined as the interaction of physiological and cognitive factors (Schachter & Singer, 1962). An inability to control anxiety, therefore, should be alleviated if the client can establish control over either the physiological arousal or the cognitive factors which accompany this emotional state.

Several modes of intervention are available for anxiety management at this time, including: (1) relaxation training, (2) biofeedback training, and (3) instruction in cognitive coping strategies.

No direct causal relationship between anxiety and muscular tension has been demonstrated (Matthews & Gelder, 1969). However indications that both result from a heightened arousal level have been validated (Paul, 1969).

The general goal in the clinical use of relaxation training has been to use relaxation as an active coping skill when confronted with an anxiety-provoking situation. The efficacy of this approach has been established

(Goldfried & Trier, 1974; Zeisset, 1968). Relaxation training, however, does not appear to affect one's susceptibility to experiencing the onset of anxiety (Stoudenmire, 1972). The use of biofeedback to aid clients in learning to relax appears to be gaining acceptance in the clinical community (Blanchard, Young, & Jackson, 1974). Subjects receiving analog information feedback have been shown to achieve deep levels of relaxation (Budzinski & Stoyva, 1969). Biofeedback without training in generalization, however, has been demonstrated to be an ineffective means of managing chronic anxiety (Raskin, Johnson, & Rondestvedt, 1973).

It appears that the crucial variable for the successful use of relaxation as an active coping skill is whether or not the subject is able to incorporate this skill into daily living rather than the manner in which it is acquired.

A final means of intervening in chronic anxiety is through the use of cognitive coping skills. Pleasant mental imagery has been shown to be as effective as biofeedback or autogenic phrases in producing relaxation for psychiatric patients (Jessup & Neufeld, 1977). The specific content of the imagery is not the crucial variable, rather, it is the relaxing quality which is of primary importance. Cognitive techniques require that the client perceive the procedures as an active coping mechanism in order to be therapeutic (Paul & Shannon, 1966). A second component of cognitive coping for anxiety management is the use of anxiety as a signal to begin a series of adaptive, rather than maladaptive, behaviors (Goldfried, Decenteceo, & Weinberg, 1974; Swinn & Richardson, 1971). Methods useful in leading to adaptive behavior include self-verbalization (Rimm & Litvak, 1969), reappraisal of the stressful situation (Sanchez-Craig, 1976), and self-observation of behavior and cognitive responses (Johnson & White, 1971).

Each of these techniques focuses on the alteration of the client's irrational belief system which has a direct effect on emotional arousal (Goldfried & Sobocinski, 1975). Regardless of the mechanism involved, cognitive techniques have been demonstrated to be effective in stress management and should form an integral part of any such program.

This study was designed to evaluate the effectiveness of a short-term stress management program incorporating progressive muscle relaxation, EMG biofeedback training, and cognitive behavior modification. The goal of the program was to improve the ability of the clients to manage their anxiety effectively and, thus, raise the probability for maximum rehabilitation. The combination of treatment modalities was hypothesized to be the most beneficial means of providing short-term treatment.

Method

SUBJECTS: The subjects for this study were ten clients identified by clinical interview as having difficulty in coping with stress to the extent that their physical rehabilitation was being impeded. Each of the clients had multiple diagnoses. The ten clients included 5 men and 5 women. Their average age was 36.8 years. Five of the ten clients were married. The average number of treatment sessions completed was 13 with a range of 7 to 24 sessions.

APPARATUS: Relaxation training was conducted in a La-Z-Boy recliner rocker. EMG biofeedback training was conducted using a Cyborg J 33 Portable EMG unit, a Cyborg BL 900 Data Processor, a Cyborg Q 880 Data Accumulator, and a Cyborg Q 740 Data Printer. All electrode placements were on the frontalis muscle.

PROCEDURE: Each of the subjects was seen for a one-hour initial interview to assess the nature and degree of their anxiety reactions. During this evaluation, the State-Trait Anxiety Inventory (Speilberger, Gorsuch, & Lushene, 1968) was administered. At this time a general overview of the treatment program was also provided.

The initial treatment session consisted of 5 minutes of EMG biofeedback training, during which preliminary EMG readings were obtained, followed by instruction in 16-muscle group progressive relaxation training administered following the procedure described by Bernstein and Borkovec (1973).

Following 3 sessions of 16-muscle group relaxation training, clients had two sessions each of 7- and 4-muscle group progressive relaxation training. The final step in training consisted of relaxation by recall alone. All of these procedures are described in more depth by Bernstein and Borkovec.

EMG biofeedback training was also conducted during each session for approximately 15 minutes following the relaxation training.

All of the clients were instructed to practice their relaxation training twice daily. In addition, differential relaxation was explained and the clients were instructed to use this technique whenever they became anxious in their daily lives.

Clients were instructed in a variety of cognitive behavior modification techniques. The initial technique presented was the monitoring and regulation of breathing. A number of internal focusing techniques were presented including task distraction techniques, such as counting backward from 100 by 7's, and emotive imagery techniques which were centered around relaxing images. Clients were instructed in the adverse effects of stress on their

lifestyles and were taught to use the physiological arousal, which accompanied their anxiety attacks, as a signal to use these techniques to actively cope with the situation. The need to use these techniques as daily living skills was stressed throughout treatment.

RESULTS: The results of this study appear to support the hypothesis that a short-term stress management program is beneficial in terms of controlling the excessive anxiety present in a number of physically disabled clients.

Four measures were obtained in this study: (1) pre- and post-treatment EMG readings, (2) pre- and post-state anxiety scores from the State-Trait Anxiety Inventory, (3) therapist ratings of improvement, and (4) vocational placement following the treatment program. A single-factor analysis of variance with repeated measures was performed for the pre- and post-treatment scores for the EMG readings, presented in Table 1, and the state anxiety scores, presented in Table 2. The difference in pre- and post-EMG readings was found to be significant, F (1,9) = 10.6, $p<.01$. The difference in pre- and post-state anxiety readings was also found to be significant, F (1,9) = 10.6, $p<.01$. Improvement on both of these measures indicates that progressive relaxation training augmented by EMG biofeedback training resulted in a significant decline in the level of perceived anxiety and the level of muscular tension. Anxiety reduction, therefore, appears to have been achieved within the treatment sessions.

The therapist ratings of improvement were based on the reports of each of the clients in regards to the successful application of the treatment techniques to their daily lives and the behavioral observations of the therapist. Six of the ten clients were rated as improved in their ability to manage their anxiety in daily living situations. The remaining four clients were rated as unchanged. Five of the six clients, rated as improved, were able to become competitively employed with the remaining individual becoming employed in a sheltered workshop setting.

DISCUSSION: The data suggest that significant changes in a client's ability to cope with stress can be effected in a relatively short period of time. It appears, however, that the ability to relax does not necessarily lead to an increase in the effectiveness of coping with stress.

Each of the clients in this study was able to reduce post-treatment EMG readings to 2.8 millivolts or less and only one of the ten showed no decrease in state anxiety scores on the STAI. Analysis of these data alone is not able to predict which clients will be able to cope more effectively with anxiety and which will not. The crucial variables appear to be the use of cognitive coping strategies and the generalization of relaxation training.

None of the four clients who were rated as failing to improve practiced progressive relaxation training outside of the treatment sessions or was able

Table 1

One-Way Analysis of Variance with Repeated Measures for Pre- and Post-Treatment EMG Readings

Source	SS	df	MS	F
Between S	21.988	9	2.443	
Within S	35.31	10	3.531	
Treatment	28.322	1	28.322	36.497**
Residual	6.988	9	0.776	
Total	57.298	19		

**$p < .01$

Table 2

One-Way Analysis of Variance with Repeated Measures for Pre- and Post-Treatment State Anxiety Scores

Source	SS	df	MS	F
Between S	1857.05	9	206.34	
Within S	1713.5	10	171.35	
Treatment	1140.05	1	1140.05	17.892**
Residual	573.45	9	63.72	
Total	3570.55	19		

**$p < .01$

to use any form of cognitive behavior modification which was suggested to them. Two of these four clients had IQ scores which placed them in the borderline range of intelligence. It may be that the present program is too complex for such clients and needs to be simplified in order to effective. The two clients of normal intelligence, who failed to improve, were already functioning within a sheltered work setting. They were also continuing to live with their parents. In this case it is felt that a more effective treatment program may have required the involvement of the family due to the nature of the familial overprotectiveness.

Overall, the present short-term stress management program appears to have been successful and has directly affected the rehabilitation of the physically impaired clients who went through it. Caution must be exercised when attempting to generalize these results, however, due to the limited number of clients included in this study.

Summary

The Curative Rehabilitation Center is continuing to research the effectiveness of short-term stress management with physically impaired clients. Several areas require further investigation including: (1) the role which biofeedback plays in regard to stress management, (2) the contribution of generalization training to the incorporation of anxiety reduction techniques into daily living, (3) the implications of this program for rehabilitating physically impaired clients of low intellectual functioning, and (4) the role of cognitive behavior modification in stress management.

The present study suggests that this approach can be an effective one, however, many questions remain unanswered and require further research.

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Implementing an Anxiety Reduction Clinic

for

College Communication Students

by

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My topic involves our efforts to implement a communication anxiety reductior clinic to serve our communications classes.

In the next few minutes allocated to me I want to do three things:

1. Tell you about our communication anxiety treatment and research project;

2. Share with you some of the findings from our treatment and research; and

3. Pose some of the dilemmas we face and seek your feedback and input regarding these dilemmas.

In short, my main hope for this presentation is not to tell you of any exciting new theories or procedures or even to share any earth shaking research findings. Instead, I am seeking your input to some of our problems and I hope this forum might be an appropriate place to get that feedback.

I think that before I can give you any specifics of our treatment and research program I should explain some of the demographics of our college population and give a brief overview of the phenomenon we are trying to research and treat.

Central Missouri State University is one of eight members of the public Missouri State University system that is separate from the University of Missouri system. Like most of the small and medium sized state colleges and universities scattered throughout the midwest, CMS began as a teachers' college and became a full university only in 1970.

CMSU has an enrollment of approximately 10,000 students and is located in Warrensburg, a town of approximately 15,000 located 50 miles southeast of Kansas City.

CMSU has almost a 50 - 50 balance of students from urban and rural backgrounds. The vast majority of those from urban areas come from either Kansas City or St. Louis. Many of our rural students come from very rural areas in the Missouri Ozarks. Less than 15 percent of the student population is non-white and another strong 10 percent foreign students. Eighty-five percent of the student body comes from Missouri.

The academic department in which I teach is called Speech Communication. It includes undergraduate and graduate study in all aspects of oral human communication excluding Theatre and Mass Communication, which are separate departments. Our largest enrollment and multiple sectioned course is our public speaking class which services all parts of the university as a component of the general studies program required of all undergraduates.

Traditionally students taking this course have verbalized and demonstrated various intensities of fear responses to assignments requiring oral presentations. This fear response we have labeled Communication Anxiety. We have created a departmental organ (the Communication Anxiety Reduction Center) to assist students experiencing debilitating anxiety reactions to public speaking assignments.

This Communication Anxiety phenomenon has been referred to in both communication and psychological literature as: stagefright, low confidence, reticence, speech anxiety, shyness, communication fear, speech attitudes, verbal reticence, self concept as a communicator, unwillingness-to-communicate syndrome, audience sensitivity, speech fright, communication apprehension and communication anxiety. As best as I can tell, each of these labels as applied by its author refers to the same general phenomenon: a fear response to a communication situation.

Traditionally within the speech communication discipline, the main problem in researching and treating this phenomenon was a lacking of conceptual clarity as well as consistency in terminology. This debilitating phenomenon experienced by a wide range of individuals was viewed prior to 1960 as a unitary and/or unidimensional construct. In short, you either had it or you did not and those who had it, all had the same thing.

It took over three decades of scholarly investigation to discover that this phenomenon is NOT unidimensional and that various types of anxiety/fear responses to communication situations exist. Unfortunately our communication scholars are still arguing now over how many types exist and what each should be called.

I do not intend to participate in that particular debate here because it would not only be fruitless, but more importantly would be inappropriate. As I see it, you probably could care less about a controversy within the communication discipline over terminology and typology. And if you do care less, you are in company with those hundreds upon hundreds of people who suffer from it and want assistance overcoming it. Therefore, for the purposes of this discussion let is suffice to say there are both functional and dysfunctional forms of communication anxiety.

By functional, I mean that type of anxiety or fear response that does not debilitate or impair oral functioning and is usually unobtrusive to an audience. An example would be the anxiety I am experiencing here now at this very moment. Internally, I am highly activated sympathetically, but so far this sympathetic activation has not been debilitating to my presentation, or I hope it hasn't.

Everyone (let me qualify by saying almost everyone) who communicates with others, be it a one-to-one formal job interview or speaking before a group of peers or appealing to a large audience, experiences some degree of autonomic activation. When this activation is not debilitating it is generally regarded as functional because subjectively it resembles an approach reaction or the fight part of Cannon's flight/fight response.

On the dysfunctional side, there seem to be two major types: performance anxiety and communication apprehension.

> Dysfunctional Type I: Performance Anxiety. This is cue-specific and is triggered only when a public performance is involved. Usually cue-specific fear responses are labeled "fear of..." or include the suffix "phobia." Yet this specific response is called an anxiety. Confusing? The reason seems to be because while the fear response is specific only to public speaking, the response can be triggered prior to the actual speaking situation. Many sufferers will experience arousal days even weeks prior to speaking or whenever just thinking about giving a speech.
>
> Dysfunctional Type II: Communication Apprehension, also called "Comm. App." is not cue-specific in that it is triggered by almost any type of oral communication stiuation. The most widely accepted definition of communication apprehension among speech communicologists describes it as an inappropriate fear response associated with either real or anticipated communication with another person or persons. In other words, the high "comm. app." will avoid communication much of the time in order to avoid experiencing the fear anxiety associated with communication encounters. This more generalized response seems to meet all of Spielberger's criteria for "Trait Anxiety."

Obviously, all communication apprehensives (trait communication anxiety) experience the performance anxiety (state) response. But not all of those with performance anxiety experience communication apprehension. Furthermore, both of these dysfunctional responses are of an avoidance type and resemble the flight part of Cannon's construct.

When we sought departmental and administrative approval for our communication anxiety reduction project, we were asked about the extent of the problem we were intending to research and treat. What we found and reported was basically this:

> Regarding Type 1 (Dysfunctional Performance Anxiety): In 1973, the Bruskin Associates, a national survey research organization based in Chicago reported that the number one fear of American adults was speaking before groups. About a year ago, Tom Browkaw of NBC's Today Show interviewed a prominant San Francisco psychiatrist who specialized in treating phobias. When asked what was the Number One phobia or the most common phobia he treated, he unhesitantly answered public speaking and added that ironically it had escaped the phobic nomenclature like acrophobia, agrophobia, etc. In our own research project, testing all enrollees in public speaking we have consistently found that over 20 percent score at least one standard deviation above the nationally reported mean for that communication anxiety instrument. This is high when you consider those who have excessively high avoidance responses can avoid taking the course.
>
> Regarding Type 2 (Communication Apprehension): McCroskey has found a minimum of 20 percent of a general population survey. Davis (76) reported that about 25 percent of the elementary students he observed suffered from high communication apprehension. Similarly reports using college students and other adult samples have found between 20 and 25 percent levels. Generally, in small colleges the levels of both types are higher. If we equate communication apprehension to Phil Zimbardo's construct of shyness then he reported finding close to 40 percent in a 1975 study.

Anyway, I am sure you can appreciate our interest and concern at a school like CMSU. Our concern is not totally altruistic. Public speaking, being our largest multiple section course, is our bread and butter and our only source for teaching assistantships for our graduate students. Any significant number of students who avoid the course or drop early hurt us class load wise. Therefore, this concern resulted in the creation of our Communication Anxiety Reduction Center.

The stated purpose of the center is to conduct research relating to the areas of communication anxiety and provide treatment services to those public speaking students who seek it. The center is staffed by me and an M.A. level graduate student whom I have trained in progressive relaxation, systematic desensitization, core counseling skills and basic Rational Emotive Therapy (RET) principles. It is our task to do all of the data

accumulation, test interpretation and treatment. Presently we are just servicing the public speaking classes which average 15 sections per quarter with an average of 22 students per class. Thus our potential client population is about 900 plus per academic year.

What we have been doing is going into each class on the first or second class day and administering a battery of three instruments: the PRCS (found in G. Paul, a public speaking state measure) the PRCA (McCroskey's communication apprehension measure), and the STAI X-2 (Spielberger's trait anxiety measure). We also include some standard demographic questions and use social security numbers for identification. The data is computer-scored and analyzed.

Students are informed through general class announcements when the scores are available for interpretation. Any student wanting test results and interpretation can sign up at our center for a test interpretation interview. Following the test interpretation any student expressing interest in assistance is scheduled for an intake interview. At the intake, verbal reports are solicited to confirm test data. A diagnosis is made, therapist assigned, and treatment mode recommended.

The main treatment modes we use are: insight therapy, systematic desensitization, and simplified RET. The basis for diagnosis and recommended treatment is the comparison of the three test scores. If the state score is within one standard deviation of the mean, we typically use a short term insight therapy. If the state score is one standard deviation above the mean or higher and the communications apprehension score is within a standard deviation of the mean, we use systematic desensitization. If both of the communication related scores are high, we use RET. Whenever we find the Trait Anxiety score one standard deviation above the mean we immediately refer to our counseling center. The reasoning behind these treatment recommendations should be clear later.

Due to time limitations, I shall not share with you our findings from our descriptive research with one exception. Consistent with published research studies, our demographic analysis has failed to demonstrate any significant trends. Specifically, we compare anxiety scores to the student's age, sex, classification (freshman, sophomore, etc.) home town size, grade point average, and major. Using a chi square test of association we have failed to find any relationships of significance with one exception and that was grade point average. There is a clear and statistically significant relationship between high grade average and low reported communication anxiety and low grade average coupled with high reported communication anxiety. This is extremely interesting since all published studies I have reviewed show no correlation between communication anxiety and intelligence.

This poses an interesting cause-effect relationship question between communication anxiety and grades.

In the time I have left, let me share with you some of the interesting findings that have come from our treatment.

1. Systematic Desensitization is extremely effective in reducing Type I: public speaking performance anxiety. The effectiveness of the treatment comes not only from self reports from students completing treatment and later giving in-class speeches, but the most important evidence of success came in our statistical comparison of change for those who had treatment with those who just had the speech class. The reduction of performance anxiety for our clients over those in the class alone was significant at the .005 level.

At the same time we have had no success generally with S. D. in treating those with extremely high communication apprehension scores that accompany high state scores. It seems that a public speaking hierarchy is too narrow to have any impact. Typically, improvement is noted in treatment sessions, but there is no real carryover to the classroom.

Post-test scores following S. D. treatment show lower levels, but not significantly. For those whose trait anxiety scores are one standard deviation above the mean and above, we have consistently experienced difficulty in even achieving a state of deep relaxation and visualization. Besides during treatment these individuals usually reveal other personal problem areas they consider more important than the speech anxiety. That is why we have developed a practice of automatically referring these people to counseling without even beginning treatment.

2. We have demonstrated great success in reaching deep levels of relaxation using a modified/abbreviated version of Progressive Relaxation. Typically we just tense/relax a few muscle groups and spend the majority of the relaxing portion using purely relaxing suggestions and visualizations without any further tensing. We have validated the success of this abbreviated procedure by using thermal and neuromuscular feedback instrumentation.

3. Recently, we have been working at demonstrating the external verification of our S. D. treatment by using thermal biofeedback instrumentation. To accomplish this we have been attaching a thermistor to the finger of the dominant hand of our clients. The biofeedback literature states that as a person achieves emotional quieting the hand temperature rises. Following the procedure of noting hand temperature prior to relaxation, following the relaxation phase, prior to visualization, during visualization, following visualization, and after treatment session is ended, we have been extremely elated with the results. We have consistently achieved the desired change in hand temperature in both directions at the expected time. We have found significant changes in temperature in both direction and intensity.

On a personal note, it is very satisfying and reinforcing for me as a helper to see the effectiveness of treatment being graphically displayed as the treatment progresses. It provides an additional informational mode that is beneficial to the overall treatment process.

4. A final treatment-related finding is the result of a very interesting project we began very recently. Following the S. D. treatment procedures I was taught and I have found in most of the procedural manuals, we have strongly encouraged our student clients to practice the relaxation each day between treatment sessions. Most students report limited success and few compare the depth of self directed relaxation to that achieved under therapist direction. For those who have diligently practiced and reported positive results, we have allowed them to do the relaxation process to themselves in treatment sessions after which we proceed with the S. D. proper. We have pondered the effectiveness in terms of depth of these various modes of relaxation. Therefore, we selected individuals who volunteered to experience three different modes of relaxation while being monitored by thermal and electromyograph biofeedback instruments.

The three relaxation modalities we chose to investigate were:

Mode 1: Self-induced relaxation (each person tested was taught Progressive Relaxation and did practice it on their own with positive results).

Mode 2: Therapist-induced abbreviated Progressive Relaxation.

Mode 3: Hypnotically-induced relaxation.

The results clearly showed that the therapist-directed modes were superior to the self-directed mode in terms of depth of relaxation measured by percent of hand temperature increase and decrease of frontalis muscule activity. Interestingly, there was not much difference between therapist-induced abbreviated Progressive Relaxation and hypnotically-induced relaxation. What differences there were among our volunteers favored the therapist-induced relaxation approach over hypnosis. We were frankly amazed to find we could get hand temperatures in the high 90's and muscle readings as low as 1½ microvolts by using the therapist-induced relaxation.

Finally, let me pose for you some of the dilemmas we are facing:

1. I mentioned our lack of success in treating high communication apprehensives with Systematic Desensitization. Yet our communication literature reports many studies that have had great success in treating comm. apps. with S. D. In fact, a recent summative document reporting on the state of the art in communication apprehension published in Human Communication Research Journal identified S. D. as the treatment of choice for communication apprehension. Such contrary findings to our own would lead me to suspect our own results.

However, the psychological literature questions the effectiveness of S. D. in dealing with generalized trait anxieties. For example, Meichenbaum, et. al. (1971) compared S. D. with RET in the treatment of speech anxious students. Analysis revealed desensitization and RET had differential effects depending upon the type of speech anxiety displayed.

"Desensitization appeared to be more effective with students for whom speech anxiety was confined to situationally specific stimuli." Conversely, S. D. is not effective with students who suffered anxiety in a variety of social situations, (a characteristic of comm. apps.) Other research (Lazaurs, 74 and Meichenbaum, 73) suggests S. D. is more effective treatment with monosymptomatic phobias and not with those who demonstrate more general anxiety of "social phobias." Therefore, the dilemma is as I see it; Is comm. app. a state anxiety treatable by S. D., or is a true trait anxiety not effectively treated by S. D.? How should it best be treated?

2. My second dilemma evolved as a result of my recently attending a bio-feedback training workshop at the Menninger Foundation. Dr. Elmer Green of Menninger's suggested that therapist-directed relaxation was counter-productive to the ultimate treatment goal of self-direction and transfer from treatment arena to the "real world." If the benefits of S. D. treatments come from relaxation, then tieing relaxation to the therapist would ultimately limit the transfer of benefit outside of therapy. However, Wolpe and other desensitization theorists may be correct that ultimate success of S. D. depends upon achieving deep relaxation, (remember I established earlier that my research results show deeper relaxation with a therapist-directed mode than self-directed). In that case, which is more important: achieving deep relaxation through therapist-induced relaxation while risking reduced transfer of results outside of therapy or use of self-directed autogenic relaxation procedures which should increase transfer while risking only ineffective depth levels of relaxation?

Which is best? Who is right? Does it matter? I really do not know.

Finally, let me conclude by reiterating my purpose was not to present any scientific research, but to get feedback and input regarding my anxiety reduction efforts and research.

I eagerly welcome your comments.

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Myoelectric Activity as a Measure of Mental Effort During Cognitive Tasks

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Introduction

It has been convincingly urged by Sperry (1952) and others that the full output of our thinking mechanism goes into the motor system. The brain's function in relation to such overt activities as coordination in walking and speaking is clear. But when sensitive monitoring equipment has been used to measure muscle activity, it has been found that such activity almost invariably is recorded during thinking as well. Increased muscle fluctuations occur as an individual responds to stimulation, whether the responses are overt or covert--such responses are found as regularly in attending and thinking as during locomotion and manual movement.

Experimental work has demonstrated that during a wide variety of cognitive tasks increased muscle activity occurs (Bills, 1927; Courts, 1942; Duffy, 1962; Jacobson, 1973; Malmo, 1975; McGuigan, 1971, 1973). However, the specific changes and pattern of myoelectric activity (which is a measure of muscle activity) during the entire course of a given task has not been systematically monitored, much less analyzed or interpreted.

As Edmund Jacobson, the most respected authority in this field, stated: "The road to a science of psychology evidently must follow a rigorous examination of the question (of) what occurs in the organism simultaneous with and indispensable to mental activities.. . . Accordingly the goal should be the determination and measurement of nervous and muscular changes specific to the mental activity studied" (1973).

Furthermore, as McGuigan states, the data presently available merely show ". . . whether or not certain events have occured . . . but to advance beyond this mere categorization of events requires us to specify the psychophysiological patterns and identify the critical events and parameters of these patterns" (McGuigan and Pavek, 1972).

The psychophysiological concept of "activation" as a measure of the intensive dimension of behavior or task directed "energy mobilization" is cited frequently in the literature and is applied here to link purely physiological measurements of muscle activity (myoelectric potentials) with psychological processes (e.g. level of mental effort).

Considerable research in the 1950's was directed to myoelectric activity as a measure of activation during motor tasks, e.g. mirror drawing, auditory tracking. Only limited research was devoted to myoelectric activity during the performance of cognitive tasks, e.g. silent reading. There is a similarity in the pattern of myoelectric activity as a function of time for all the tasks previously investigated. In each case, from initiation to completion of the task there is a progressive increase in myoelectric activity (EMG voltage) which may have the same functional dependence on time. To date, no one has

investigated, much less established, the nature of this general relationship, either qualitatively or quantitatively, if it in fact exists.

This research provides a detailed investigation and quantitative analysis of the changes in muscle activity during the performance of two cognitive tasks: memorization-recall, and mental arithmetic, each at three levels of difficulty.

Each of the three digit recall tasks consisted of 10 sets of orally-presented digit strings. To vary the difficulty of these three tasks, digit strings of 4, 5, and 7 numbers were used. To control for speed of task presentation and task performance each of the digits were presented serially at the rate of one digit per second. All subjects were required to respond at the rate of one digit per second.

Each of the mental arithmatic tasks consisted of 10 sets of 4 orally and serially presented digits (e.g., 3, 9, 1, 6). To vary the difficulty of these three tasks, subjects were to transform by mentally adding with 0, 1, or 3 to each of the 4 original digits in the set. Kahneman (1973), in a different context, has demonstrated that the selected transformations (0, 1, 3) are progressively more difficult. By adding 0 mentally to the set presented above, as an example, the set remains 3, 9, 1, 6; by adding 3, the transformed set becomes 6, 12, 4, 9.

All digits were presented orally and all transforms had to be done mentally and presented orally to the Examiner. The digits were presented at the rate of one digit per second. Subjects were required to respond at the rate of one transformed digit per second.

Changes in muscle activity occurring during the performance of these cognitive tasks were measured by electromyographic signals recorded from the frontalis (forehead) muscles of 17 volunteer adults between the ages of 25 and 40. These signals were rectified, integrated for one second, and recorded at the rate of one sample per second (see Figure 1).

For each task, at each level of task difficulty, muscle activity was recorded continuously according to the following controlled time sequence: (1) a 120-second relaxation phase; (2) a 100-second instructional phase; (3) a task phase composed of 10 trials; and (4) a 120-second post-task phase.

Each subject performed each task at all three levels of task difficulty. That is, each subject performed all six tasks. Figure 2 displays graphically the data collected for a subject for all six of the tasks performed. The order of task presentation is from the bottom of the page to the top of the page and represents the order in which the subject performed the given tasks. The time phases are separated by vertical lines in order to provide an easier visual picture of these distinct phases.

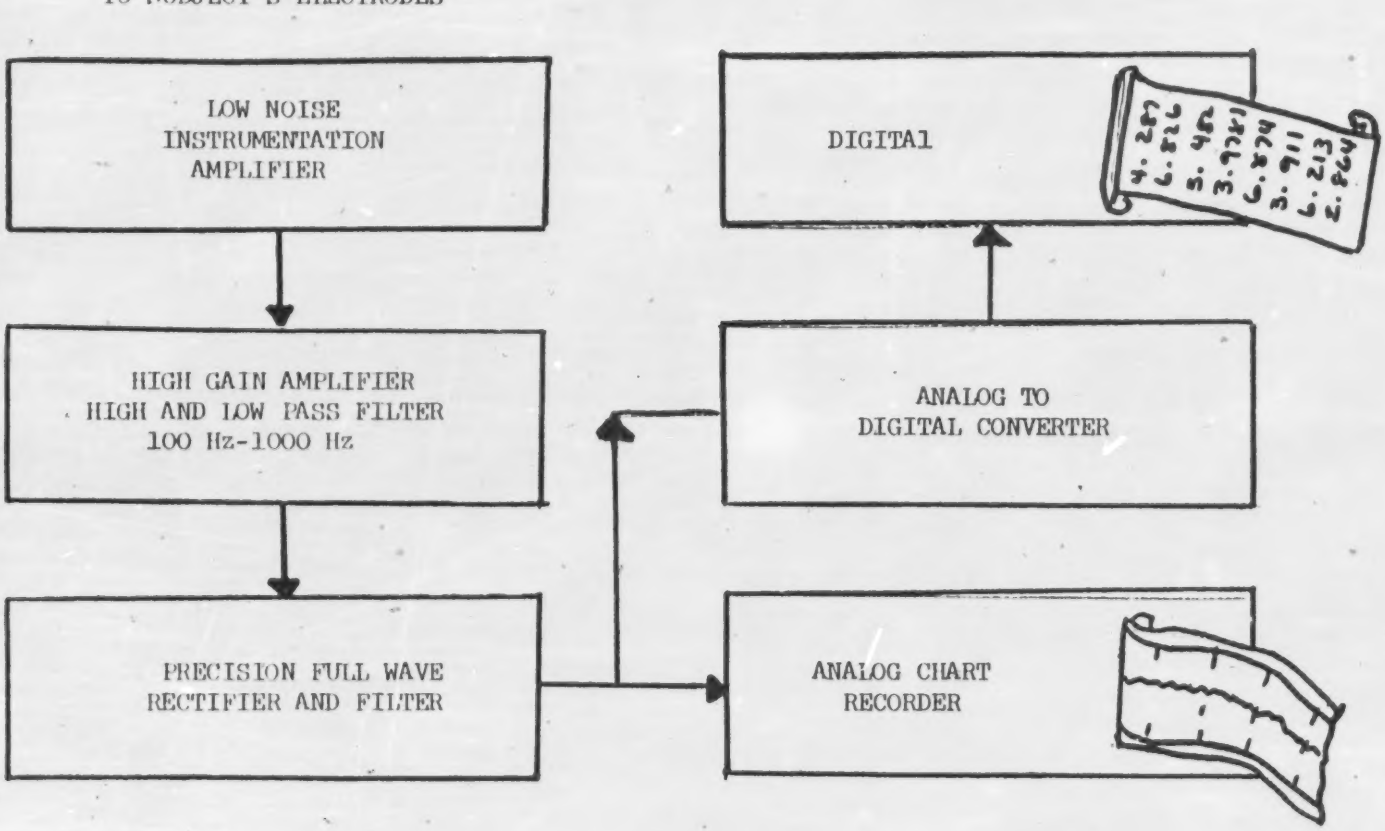

Figure 1. Block Diagram of Basic EMG System

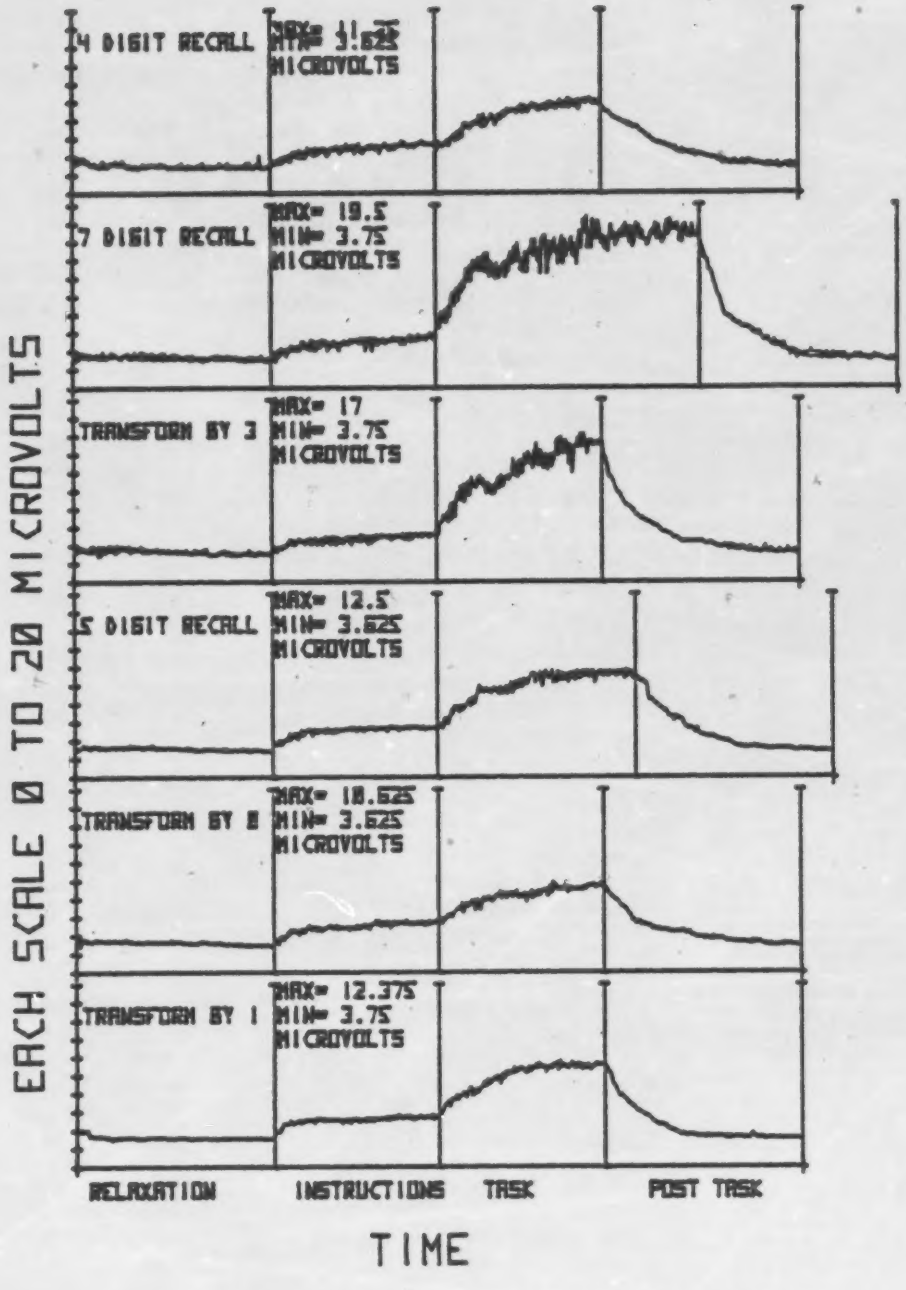

FIGURE 2. FRONTALIS EMG AS A FUNCTION OF TIME ALL TASKS FOR A SINGLE S USING A COMMON EMG SCALE

Note that the graphs for the 5 and 7 digit recall tasks extend further in time than the other four tasks since these two tasks required longer time intervals for performance (120 seconds for the 5 digit recall task and 160 seconds for the 7 digit recall task). Each of the ordinates (vertical axis) for the 6 graphs extends from 0 to 20 microvolts. With this type of graphic presentation it is possible to visually compare the relative increase or decrease in EMG activity as a function of time and task type.

When such comparisons are made for each subject it is found that despite fluctuations there exists certain uniform and general characteristics for EMG activity as a function of time. That is, on the whole, when all the individual graphs for all the subjects are compared (Berman, 1978) they exhibit the same type of changes in EMG activity as a function of time and task type.

The EMG activity recorded and averaged for all 17 subjects for each of their 6 tasks (N=102) is presented in Figure 3. This figure suggests the following general pattern of EMG activity for all the tasks under investigation:

I. EMG activity during the relaxation phase appears to be a linear function which decreases with time.

II. The EMG activity during the instructional phase increases with time and is greater than the EMG activity observed during the relaxation phase.

III. EMG activity progressively increases throughout the task phase. It is during this phase that the EMG activity reaches a maximum value.

IV. EMG activity during the post-task phase is a rapidly decreasing function of time reaching a minimum value of the order of the minimum EMG value reached during the relaxation phase.

V. Both the task and the post-task phases seem to display a functional form involving exponentiation.

EMG Activity As A Function Of Task Type
(Across Task Differences)

Figure 4 shows the average of all 17 Ss for each of the three recall tasks plotted on the same graph. Figure 5 shows the same information for each of the three transformation tasks plotted on the same graph. Both figures exhibit the same general pattern of EMG activity as seen in Figure 3. From these figures the most obvious differences across tasks occurs during the task phase. One such difference is the dependence of the EMG peak value on task type. Table 1 summarizes this dependency.

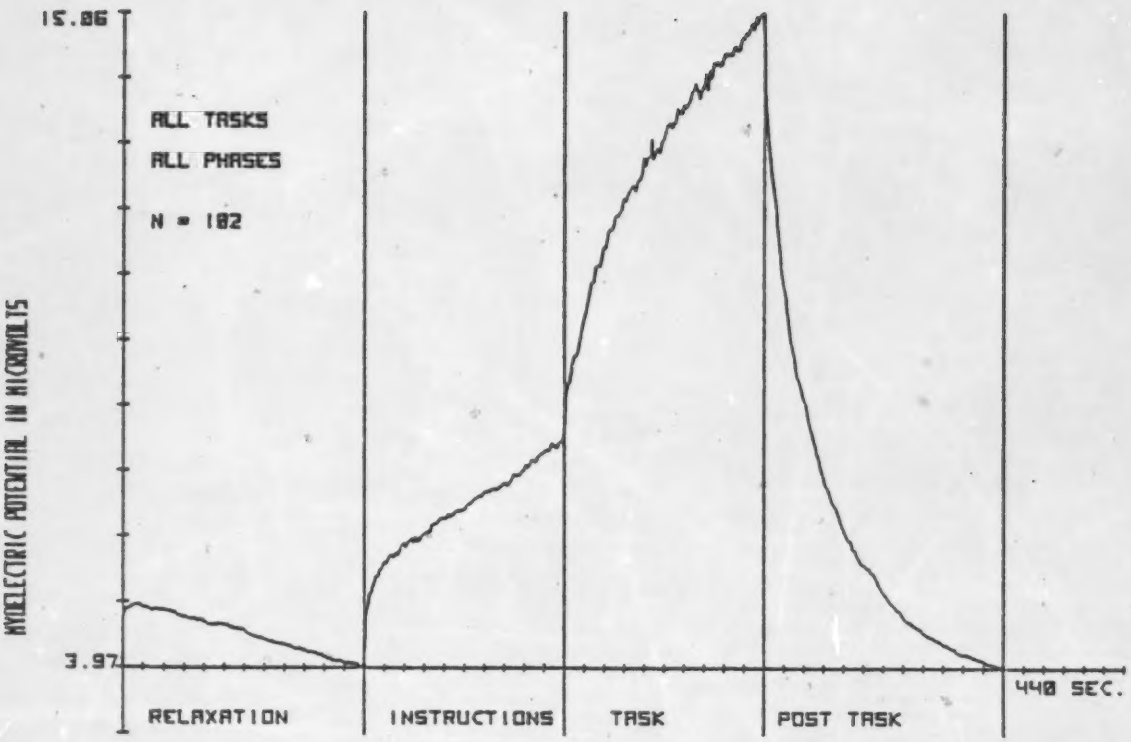

FIGURE 1. FRONTALIS EMG AS A FUNCTION OF TIME AVERAGED FOR ALL SUBJECTS AND ALL TASKS

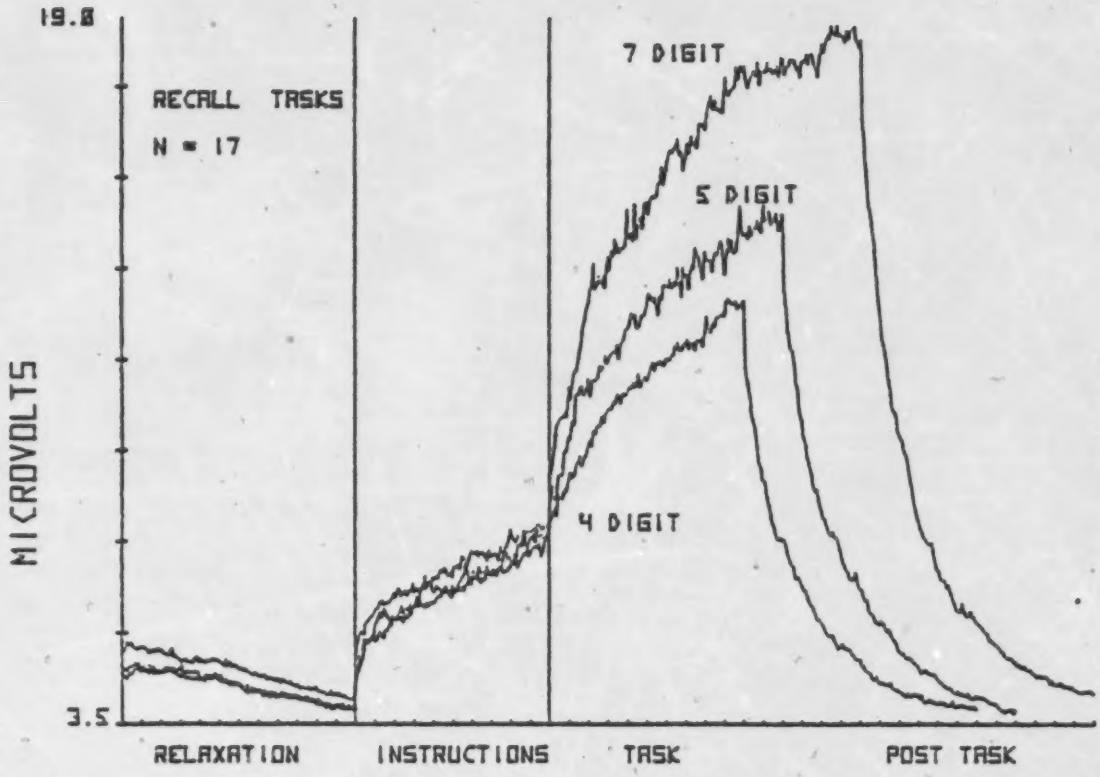

FIGURE 4. FRONTALIS EMG AS A FUNCTION OF TIME FOR ALL RECALL TASKS AT THE THREE LEVELS OF DIFFICULTY

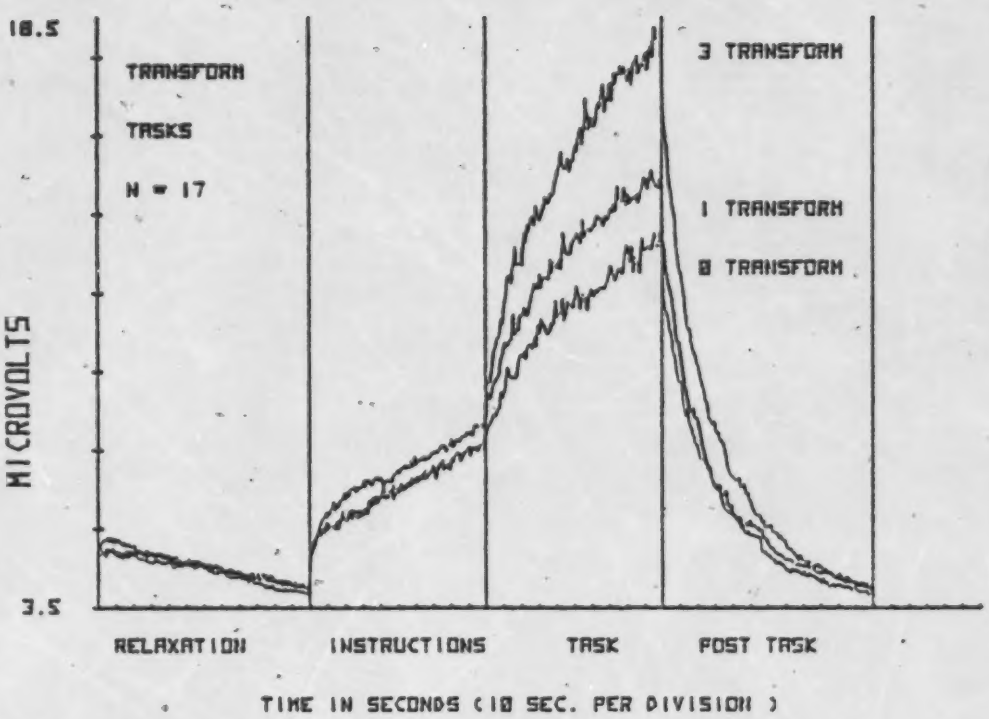

FIGURE 5. FRONTALIS EMG AS A FUNCTION OF TIME FOR ALL TRANSFORM TASKS AT THE THREE LEVELS OF DIFFICULTY

Table 1

Peak EMG Values in Microvolts for the Task Phase

Task Type	Task Duration in Seconds	Peak EMG Value
4 Digit Recall	100 seconds	12.85 microvolts
5 Digit Recall	120 seconds	14.90 microvolts
7 Digit Recall	160 seconds	18.85 microvolts
Transform by 0	100 seconds	13.15 microvolts
Transform by 1	100 seconds	14.63 microvolts
Transform by 3	100 seconds	18.26 microvolts

Table 1 suggests that the peak EMG value increases with task difficulty.

In addition, the initial time rate of change of EMG activity (i.e. initial slope) appears to be an increasing function of task difficulty. For example, the initial slope for the 7 digit recall task appears steeper than for the 4 digit recall task.

For Figures 4 and 5 the task and post-task phases are both suggestive of functions involving exponentiation. In particular, for Figure 4, the recall tasks, where the task length increases (both the 5 and 7 digit recall tasks) there is a tendency for the EMG activity to "plateau" towards the end of the task phase. This effect is most clearly seen in the case of the 7 digit recall task.

From both the graphic presentation and the EMG values shown in Table 1 it appears that the general pattern of EMG activity for the transform by ϕ and the 4 digit recall task are nearly identical. Their peak EMG values over the same time interval (100 seconds) are 13.15 microvolts and 12.85 microvolts respectively.

In general, from both individual and group data the amplitude of fluctuations in EMG activity appears to be maximum for the task phase. Furthermore, there appears to be a progressive increase in fluctuation amplitude from the relaxation phase to the instructional phase and from the instructional phase to the task phase.

In summary the following general observations have been made:

I. There appears to be a universal or general pattern of EMG activity as a function of time for all the tasks investigated.

II. The EMG activity during the relaxation phase is a decreasing function of time.

III. EMG activity during the instructional phase is an increasing function of time. This functional form appears to involve exponentiation.

IV. EMG activity during the task phase is a still further increasing function of time, also being of a form involving exponentiation.

V. The initial slope as well as the peak amplitude for EMG activity reached during the task phase appears to be a function of task difficulty.

VI. EMG activity during the post-task phase is a decreasing function of time reaching a level comparable to the minimum relaxation level.

These conclusions based on qualitative observations will be quantitatively investigated in the following section.

A simple model is proposed to account for this general and pervasive EMG pattern. It is postulated that there exists, for each type of task including listening to instructions, a maximum (and possibly optimum) level of activation, A_f. Although A_f is an intrinsic element of the system's assessment of the task, this limiting value may not actually be achieved if the task time is too short. A_f should be viewed as the limiting activation if the task time was sufficiently long. It is however, essential to note that the system will mobilize itself in such a way as to approach A_f. The model proposed must account for the time course of energy mobilization, i.e. activation, from initiation of a task until A_f is reached. The change ΔA in activation level in a given time interval Δt must be proportional to the difference between the final activation level A_f assigned to the task and the system's current level of activation A, i.e., $A_f - A$. Thus,

$$\frac{\Delta A}{\Delta T} \text{ proportional to } A_f - A.$$

Assuming that frontalis myoelectric potential is proportional to activation A, and the constant of proportionality is α, then

$$\frac{dE}{dt} = \alpha (E_f - E)$$

subject to the initial condition that the EMG potential at the beginning of the task is E_i ($E = E_i$ for $t = 0$). This differential equation leads to the proposed and experimentally observed function of the equation

$$E \text{ (in microvolts)} = E_i + (E_f - E_i)(1 - e^{-\alpha t}). \qquad (1)$$

The model suggests that the individual makes an assessment E_f of the energy required to accomplish a specific task. Kahneman has proposed that this assessment is based upon the level of the task's difficulty as perceived by the S and is not a function of externally manipulatable variables such as

incentives for performing a task well (Kahneman, 1970). The time rate of change of the energy mobilized initially is greatest at the onset of the task and decreases as the task progresses. This type of change as a function of time is a characteristic of exponential functions in general and the specific form of exponential proposed in this investigation. When the task is terminated, there is also a characteristic pattern to and time for the system to return to the pre-task level of activation.

Therefore, both E_f, the limiting EMG value and α the proportionality or "decay" constant are characteristic parameters of the system. E_f is characteristic of task difficulty while α^{-1} is a characteristic time for the system. For example, the time required for the system to reach 67% of its final value for an α of 0.02 would be $1/\alpha = 50$ seconds. E_i is characteristic of the pre-existing activation of the system at the beginning of the task per se.

The slope of equation (1) can be obtained by differentiation with respect to time. Denoting slope as S,

$$S = \frac{dE}{dt} = (E_f - E_i)\ \alpha e^{-\alpha t} \qquad (2)$$

The slope is a function of time and is steepest at $t = 0$.

$$S_{t=0} = (E_f - E_i)\ \alpha$$

and is zero at $t \to \infty$.

Equation (1) cannot be approached with the usual methods of regression analysis because the equation is not linear in the coefficients, nor can it be transformed to a linear form. However, the method of least square is applicable and with the speed of a computer, parameter space (E_i, E_f, α) can be searched for the minimum chi square (Bevington, 1969; Draper & Smith, 1966). Such an analysis was carried out for the average of all six task phases as well as for each task phase separately. In the cases of the 5 and 7 digit recall tasks, only the first 100 seconds of data were used.

Figures 6 and 7 illustrate the curve fit to the data during the task phases at each level of difficulty. The very excellent fit is quite apparent. Furthermore from the least square analysis values of initial EMG E_i, final EMG E_f, and α were derived for each task (Berman, 1978).

These parameters may be used to quantify task difficulty and therefore provide a relative scale of task difficulty as illustrated in Table II. In addition to the six tasks per se, the instructional phase, treated as a task, has been included. This is a reasonable inclusion since mental effort is involved with listening to instructions. The work of Wallerstein (1954) which is a simple listening task has also been included. The results of this latter experiment have been analyzed by the technique discussed in this paper.

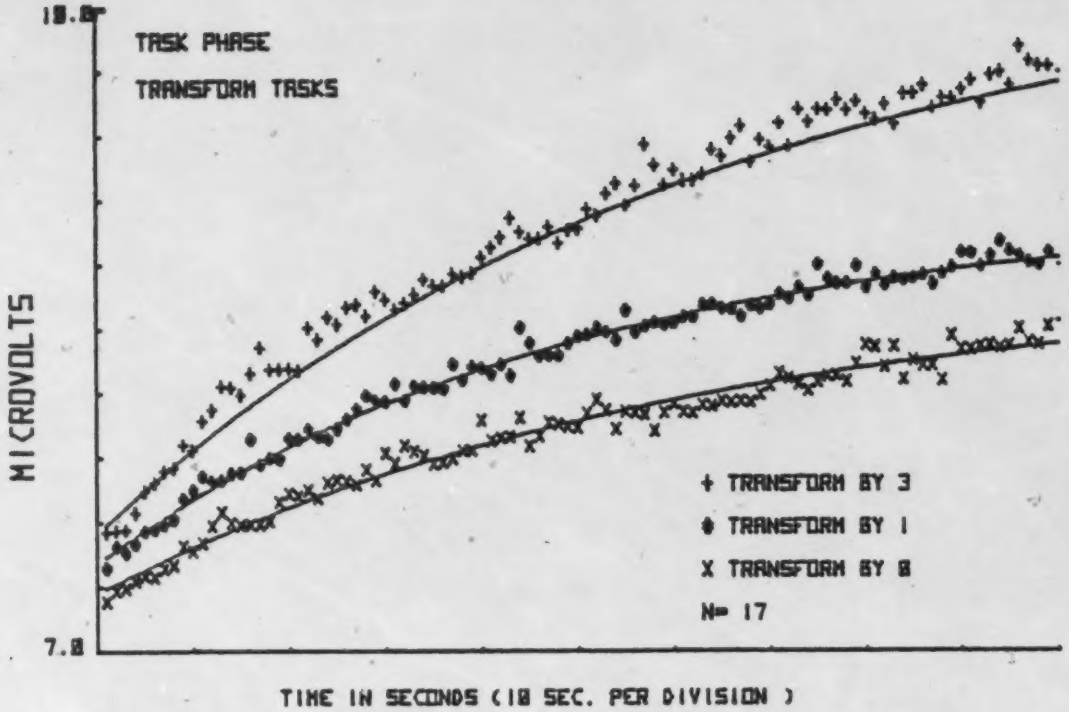

FIGURE 6. FRONTALIS EMG AS A FUNCTION OF TIME FOR THE THREE TRANSFORM TASK PHASES

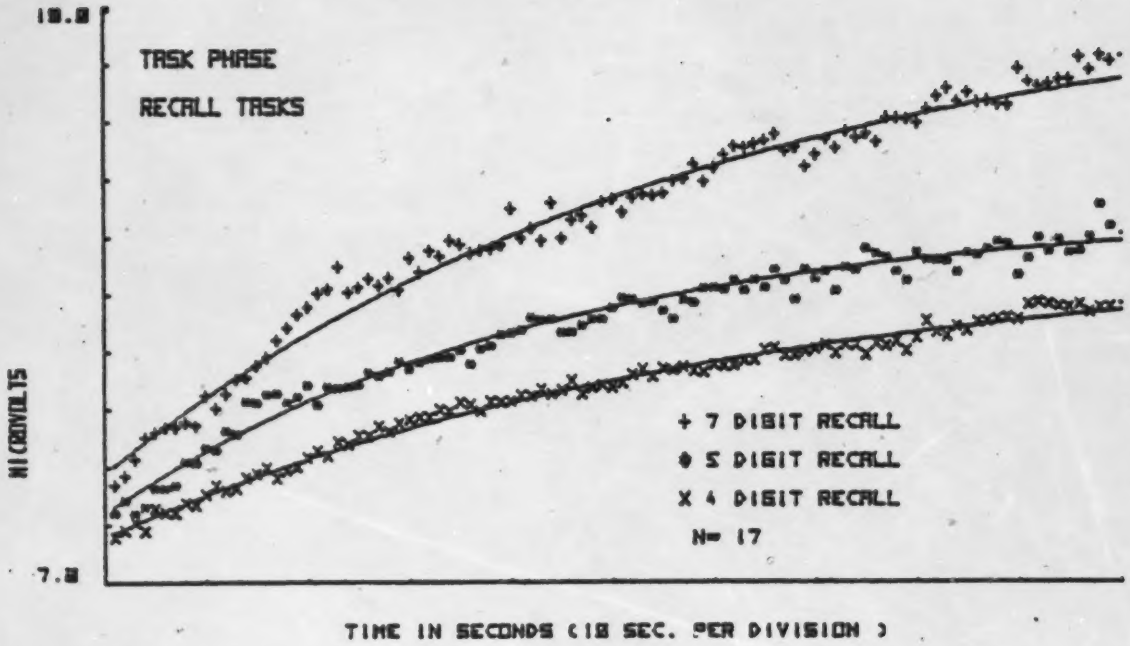

FIGURE 7. FRONTALIS EMG AS A FUNCTION OF TIME FOR THE THREE RECALL TASK PHASES

Table II

A Scale For Task Difficulty

Task Type	$\alpha (E_f - E_i)$ Figure of Difficulty	Normalized Slopes
7 Digit Recall	0.171	12.21
Transform by 3	0.168	12.00
5 Digit Recall	0.139	9.93
Transform by 1	0.131	9.36
4 Digit Recall	0.095	6.79
Transform by ϕ	0.093	6.64
Instructions for Tasks	0.035	2.43
Listening to a Story (Wallerstein's data)	0.014	1.00

Intuitively one would expect the tasks to be ranked as shown in Table II. The present study provides a quantified basis for such rankings. The third column in Table II shows each task normalized to the simplest task studied - listening. Although it would be tempting to suggest that for example the seven digit recall task is twelve times more difficult than the simple listening task, there is no reason to expect a priori that the relationship is linear. Until further research on this issue is completed, the ranking must remain relative. One may anticipate, however, that if a second measure such as performance error rate is utilized, the functional form of the ranking may be determined.

Summary

This work supports the concept that mental activity produces a well-defined EMG (muscular) pattern. Furthermore, the more difficult the cognitive task the higher the activation as measured by frontalis EMG activity.

Third a simple activation model has been developed which fits the data extremely well and quantifies the relative task difficulty.

This model is able to predict the time course of EMG activity throughout a cognitive task.

Finally, these results contradict the distinction which has been made between physiological and cognitive activation. In this case a cognitively stressful situation generates clearly defined EMG activity which is proportional to the degree of stress. When the stressor is removed the degree of activation decreases.

Acknowledgment

This work was supported in part by grants from Med Associates Inc. and the Biofeedback and Stress Management Institute.

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Report of the Certification Committee of AAATC

Summary of discussions held Friday, October 27 and Sunday, October 29 at the Fifth Annual Meeting of AAATC at the Bismarck Hotel, Chicago, Illinois.

A. Bruce Frederick, Chairperson

State University of New York

Brockport, New York

It was determined that present efforts in certification should be concentrated in education (preventative medicine). Such efforts would include criteria for group instruction as differentiated from clinical methods which typically feature an interaction between therapist and patient. Dr. McGuigan is presently designated to offer certification in clinical Progressive Relaxation and some initial thought has been given to the need for certification in instrumentation as it relates to the needs of tension control in the clinical setting. The present work of the Committee shall be confined therefore to the development of a program devoted to education.

The Committee unanimously supports a certification program that features the methods and techniques of Progressive Relaxation (PR) as adapted for group instruction. Tension control classes featuring PR would be taught by AAATC certified instructors in such diverse institutions as public schools, colleges, associations, hospitals, medical centers, clinics and industrial organizations where group instruction is commonly offered for a variety of purposes. The adoption of Progressive Relaxation as the base of the certification program is due to its established record of use in a number of educational programs with generally good results.

Progressive Relaxation has been taught in public schools and colleges for a period of approximately twenty-five years with initial efforts in group instruction having been tested by a comprehensive program developed for the Navy near the end of World War II. The latter program and many which followed later could all be traced to instructors with special training obtained at the Laboratory for Clinical Physiology in Chicago or the Williams College also in Chicago. Dr. Edmund Jacobson trained many individuals personally including Dr. Arthur Steinhaus who later established a certification program under the aegis of the Foundation for Scientific Relaxation. Miss Bernardine Lufkin coordinated the activities of the Foundation for Scientific Relaxation for a number of years and helped to develop materials for instructors. When she retired, the efforts of the Foundation were less visible although a certification program is still available at George Williams College.

Although no other technique that is presently available for the general relief of tension states has been adapted for or tested for effect in the field of education, the Committee supports the continuing policy of AAATC to be continually alert for methods and techniques which would support, supplement and compliment instruction in PR. The Committee is therefore interested in any method or technique which can be adequately judged and measured by the rigorous demands of science.

Little longitudinal data are available at present which demonstrate the effect of group instruction in tension control on the general health status of selected populations. It is therefore the hope of the Committee that widespread certification will result in the eventual training of sufficient segments of the population in a standard method of instruction that might in turn be tested for a longitudinal effect. In light of this goal, it would seem that programs especially designed for elementary school-aged children are especially valuable.

The Committee has proposed a Certification Conference for the purpose of examining appropriate criteria and standards for group instruction in tension control. The goal of such a conference would be to outline the curriculum in PR and the requirements of individual instructors who would be certified under the aegis of the AAATC to teach the specified components of the standardized curriculum developed.

The Conference would bring together an experienced group of professionals with established credentials in group methods of PR inclusive of actual teaching experiences at a number of levels. In most instances, invitations to participate in the Conference would be extended to those individuals who have been teaching in established programs.

We hope to secure funding for such a Conference at the earliest possible date and convene in a suitable location to accomodate all invited participants. Some members of the Committee suggested that some product resulting from the Conference might be proposed in order to attract a number of potential funding agencies. For example, a manual of observational techniques might be developed for those within and beyond the field of tension control. A recent publication developed by Blue Cross - Blue Shield was mentioned (A Report from Your Blue Cross Plan - Stress Volume XXV, No. 1 of Blue Print for Health, 840 N. Lake Shore Drive, Chicago, Ill., 60611). A number of prominent contributors are featured in this publication. Dr. Woods has suggested Roche Laboratories as a possible source of funding (Journal of Human Stress) for a Certification Conference and we will follow up on this idea as soon as possible. Other topical matters for the suggested Conference are found in the points below.

The George Williams Model - We had the good fortune to have been able to meet with Ed Langbein of the George Williams College who reported that the original certification program established by Dr. Steinhaus is still in place at George Williams. The certification program consists essentially of three parts:

1. Personal Skill - Instruction in Progressive Relaxation (called "neuromuscular relaxation" by Steinhaus) following the standard outline of fifteen lessons originally developed in cooperation with Dr. Jacobson and the Foundation for Scientific Relaxation.

2. Knowledge - Lectures in methods and techniques of instruction in PR. This would include a number of topics expanded from the original fifteen lesson outline as well as instruction in the use and evaluation of a personal log for self-observation between classes.

3. Apprenticeship or Internship - An experience in teaching under the supervision of the George Williams College staff. Each trainee works with approximately ten students who are enrolled in the basic course (fifteen lesson course for personal skill development). At the end of this experience, trainees are evaluated and may be awarded the George Williams certification in the "theory, practice and teaching of relaxation."

Those present at the Friday meeting of the Committee thought the George Williams Model should be considered for adoption by the AAATC since it is a well established program and would provide us with a good head start. This program will therefore be reviewed and modified for the present needs of certification under the aegis of the AAATC and will represent the bulk of the work to be taken up at the proposed Certification Conference.

The Committee supports a certification plan for group instruction in general education (preventative medicine) that will not require the use of electronic apparatus. The Committee considers apparatus such as the EMG as extremely important in the scientific appraisal of tension states and supports its use as a supplement to instruction if that can be arranged. The justification for the Committee's position is based upon the Steinhaus-Norris study (Dept. of HEW Cooperative Research Project No. 1529, 1964) which showed that an effective instructional group program in neuromuscular relaxation might be conducted by appropriately trained persons.

Questions related to certification which must be taken up at the proposed Certification Conference:

1. Who is eligible for certification?

   A. "Grandfather" clause?
   B. Those previously certified?
      1. George Williams?
      2. Edmund Jacobson?
      3. Bernardine Lufkin?
      4. Joe McGuigan?
      5. Michigan State University?
      6. Other

The Committee is interested in compiling a list of all of those who have been trained and/or certified in the past by any of a number of certifiers. Such individuals should then be contacted to determine their present status and to learn about any programs they have developed. A questionnaire of present status should be developed to obtain a clear picture of each individual's experience in the field.

2. When is a person trained? The George Williams study indicated that "trained" was based upon the successful completion of an eight week program. Should such training and/or documentation of same be required as an entrance requirement for certification?

3. What are the overt signs of tension that are observed by the experienced teacher of PR? As stated above, this might be answered in a form suitable for publication and distribution to the general population.

4. Written knowledge tests. We have some tests that have been submitted for examination of the committee. Test items must be categorized into item forms from which appropriate objective tests might then be developed.

I distributed a limited number of copies of a manuscript developed for ERIC's Clearinghouse on Teacher Education. This agency has been interested in developments in tension control training and has frequently included documents of AAATC members in their retrieval system (microfiche). The present manuscript will appear as a pamphlet for teachers giving basic information and definitions. The Chair thanks those who were kind enough to supply feedback during the meetings.

Two other meeting participants identified themselves as interested in the Certification Committee. They are:

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Springfield College
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Wes Sime introduced a new technique he employs during the introductory phases of his class. I am hopeful that he will outline this procedure for some future Newsletter. There is a need for a periodic newsletter for teachers which follows the general format of the one produced by Bernardine Lufkin for those certified instructors who were associated with the Foundation for Scientific Relaxation. Each instructor has undoubtedly developed at least one innovation worthy of sharing with others.

Text used for most general courses (if at all) is the current paperback edition of Jacobson's You Must Relax.

I was encouraged by the apparent enthusiasm for the work of the Committee. Although we had fewer registrants for the Fifth Annual Meeting than at previous meetings, there was a sizable group of perhaps forty persons who attended the Committee's report session just prior to noon on Sunday. It is my hope that we will obtain the necessary funding for a Certification Conference and that one year hence we will have seen a great deal of progress.

A. B. Frederick

P.S. The following films are available from the Audio Visual Service of the University of Washington and have been suggested for classes by Dr. Woods. (Rentals)

What Makes Muscle Pull (1972, $7.00)
The Muscle Spindle (1970, $10.50)
Human Muscle Spindle - An Advanced Study (1972, $13.50)
Life Crises and Physical Complaints ($6.00)
Stress (Selye, 1957, $6.00)
Energetics of Life (1972, $12.50)

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